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(Original Official Organ U. S. Vet. Med. Assn.)

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"BREEDING PROBLEMS" NUMBER

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JOURNAL

OF THE

American Veterinary Medical Association

FORMERLY AMERICAN VETERINARY REVIEW

(Original Official Organ U S. Vet. Med. Ass'n.)

H. Preston Hoskins, Secretary-Editor, 735 Book Building, Detroit, Mich.

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Vol. LXV, N. S. Vol. 18 May, 1924 No. 2

ANOTHER SPECIAL NUMBER

Continuing our plan of issuing special numbers occasionally, we call attention this month to a number devoted very largely to breeding problems, including abortion and sterility. Our educational number (April) met with a very warm reception, and quite a number of our members have written us highly complimentary letters about it.

It is not our intention to publish these special numbers every month, as such a plan would hardly be possible. However, from time to time, as we are able to accumulate the necessary material, we will issue these special numbers. We might call attention, at this time, to two recent issues of *The Veterinary Journal* (London). The January number was made up entirely of articles on the subject of toxicology, and the March issue was a special foot-and-mouth-disease number. Both contained a number of very interesting articles in the fields mentioned.

In this number we would call attention to the splendid paper by Dr. Pfenninger, summing up our present knowledge on the subject of white scours. The paper by Drs. Dimock and Caslick, read at Montreal last summer, is a distinct contribution to the subject of sterility in mares. In a very practical manner, Dr. Way gives us, in his paper, the benefit of his wide experience in

treating functional disorders of the reproductive organs. Dr. Williams presents the results of his extremely careful study and analysis of the California experiments with abortion vaccine, reported at the Montreal meeting, by Drs. Hart and Carpenter.

In the field of sheep practice, Drs. Welch and Marsh give us the results of their investigations of abortion among sheep caused by a vibrio. Drs. Schroeder and Cotton report some very interesting experiments with *Bacterium abortus* infections, while Drs. McNutt and Murray report the isolation of the same organism from the fetus of an aborting mare. Dr. Warwick opens a new field in veterinary surgery, namely, vasectomy as an operation with considerable possibilities.

In the instalment of the proceedings of the Montreal meeting, published in this issue, will be found Dr. Ferguson's address on the subject of cesarian section, supplemented with a discussion of this important operation by several other well known veterinarians. Do not fail to read Dr. Kingman's report of the Montreal clinic.

We would also call attention to the abstracts published this month. These were prepared by Dr. W. W. Williams, and he has been kind enough to add his own observations to the abstracts. The articles drawn upon were published in medical journals, and we believe that veterinarians, whose work deals largely with diseases of breeding animals, will do well not only to read the abstracts but examine the original articles.

WE ASK SIX QUESTIONS

Section five of our Code of Ethics prescribes how a veterinarian may advertise, in about half a dozen words; but what he may not do is clearly specified, at some length. Among the things which will not be countenanced by the Association is "advertising through newspaper puffs." Now then:

If there is a serious outbreak of some disease among the live stock in a certain state, and the State Veterinarian is interviewed, followed by a write-up in the local paper, is the State Veterinarian, on account of his official position, amenable under our code of professional ethics, or is he guilty of a violation of it?

If a county has a veterinarian in its employ, and he is particularly successful in his efforts at controlling or eradicating animal diseases, so much so that his work attracts attention and is made the subject of a very nice piece of newspaper publicity,

embellished, perhaps, with a photograph or two, showing "Our County Veterinarian at Work" is he violating either the spirit or the letter of our code of ethics?

If a city adopts a meat inspection ordinance and a veterinarian (the logical person) is placed in charge of its administration, is he guilty of a breach of the code of ethics if he grants an interview to a reporter of the local paper, for the purpose of explaining the new ordinance, and incidentally gets a good send-off in the paper?

If the dean of one of our veterinary colleges grants an interview to a feature writer for one of the great metropolitan papers, and as a result the college gets some well-deserved and much-needed publicity, and perhaps the dean or some member of the faculty gets his picture in the paper, is this an infringement upon our code of ethics?

If a practitioner invests every cent he can scrape together in the building and equipping of a modern veterinary hospital in one of our cities, and the venture attracts an inquisitive reporter, who immediately sees a story in sight, and the veterinarian and his hospital are the subjects of a full-page article in the next Sunday edition, has our veteriniarian, because he happened to be a private practitioner, violated our code of ethics?

Our sixth question is: "When is a puff not a puff?"

FORT DES MOINES HOTEL

DES MOINES OUR 1924 CONVENTION CITY

Within the space of a very few years, Des Moines has become one of the recognized convention cities of the nation and many of the largest and most important national and world events have been successfully entertained and cared for. "THERE IS A REASON."

Des Moines is centrally located, reducing the cost of transportation and time in travel to a minimum; has forty-five hotels in the down-town district, within a radius of six blocks, with upwards of 6,000 guest rooms. Adequate meeting places for all the events are ample and convenient.

Des Moines is a progressive city, of approximately 140,000 population and rapidly growing. Its interests are diversified and consequently not easily disturbed by changes in business conditions affecting specific lines.

Des Moines covers an area of fifty-six square miles, has 850 acres devoted to parks and play-grounds, is noted for its fine residence section, country clubs, golf links and leads the nation in percentage of home owners (51.1%). Its river front and civic center, where many of its public buildings are located, are most interesting to visitors, showing the marked progress made by well-developed city-planning.

Des Moines has 12 universities, colleges, and special schools, with a yearly attendance exceeding 8,000. The independent school district of Des Moines employs 900 instructors, operates 72 buildings and enrolls 30,000 students. Five million dollars is now being authorized and being expended on new school buildings and present equipment.

Des Moines has 400 factories capitalized at over $50,000,000 with a yearly output of $75,000,000. It is the heart of the North Central Iowa coal fields, producing 2,500,000 tons of fuel annually. Nineteen radiating lines of steam railways, interurbans and hard surface roads, radiating in every direction and serving an extensive trade area, whose buying power is unexcelled in the world, make Des Moines the natural and logical manufacturing and distributing center of the great Mid-West.

Des Moines' freight tonnage amounts to approximately 2,500,000 tons annually. Over 200 merchandise cars, with package freight, leave Des Moines daily. Des Moines is known the world over as a great insurance center. There are 54 home office companies employing over 2000 persons and covering the entire field of life, casualty and fire insurance.

Des Moines ranks fifth in the United States in the amount of out-going, second-class, mail matter, with sixty-odd publications, producing a total of 11,135,000 copies every month, all of which affords an unexcelled medium for national publicity. Postal receipts for the fiscal year amount to $2,582,253. Progress is based on knowledge. Iowa spends, every year, approximately $25,000,000 and ranks first in literacy. Iowa has never known a crop failure and this prosperous condition extends well into bordering states.

Des Moines awaits your coming, August 19-20-21-22, 1924.

PLANS FOR DES MOINES

The place: Des Moines, Iowa.
The time: August 19-20-21-22, 1924.
Headquarters: Fort Des Moines Hotel.
Official route: Rock Island.

BIRD'S-EYE VIEW OF PROGRAM

Monday 18	Tuesday 19	Wednesday 20	Thursday 21	Friday 22	Saturday 23
Meetings of Executive Board and Standing and Special Committees	*Morning* Opening Session	*Morning* Section Meetings	*Morning* General Session	All-day Clinic at Iowa State College, Ames	Visit to Iowa State Fair Special Racing Program
	Afternoon Business Session	*Afternoon* Business Session	*Afternoon* Business Session		
	Evening Alumni Meetings	*Evening* Reception Banquet and Dance	*Evening* Section Meetings		

Through Dr. N. J. Deiling, of Dallas Center, Iowa, one of the members of the Local Committee on Arrangements, Mr. A. R. Corey, Secretary of the State Fair Board, has arranged the following program for the special benefit of the veterinarians who visit the Fair on Saturday.

Free-for-all pace, the three world's champions:

Margaret Dillon	1:58¼
Single G	1:58½
Sir Roch	1:59¾

Three-year-old trot (eligible to 2:25 class).
Three-year-old pace (eligible to 2:25 class).
5-furlong run. 4½-furlong run.

Secretary Corey has also announced that the baby beeves will be judged on Saturday. There will be in the neighborhood

of 500 head on exhibition, without question the largest baby beef show held in the United States this year.

A special program for the entertainment of the ladies is being arranged by Chairman Bemis and his Committee. This will include breakfasts, luncheons, lawn fetes 'n'everything. More later.

CORN STATES THROUGH THE AIR

On Tuesday evening, April 1, 1924, at 6:00 p.m., Mr. G. H. Williams, President and General Manager of the Corn States Serum Company, of Omaha, Nebraska, spoke over the radio from the Woodmen of the World Station, WOAW, at Omaha.

Mr. Williams' subject was "Anti-Hog Cholera Serum and Immunization against Hog Cholera." He emphasized the fact that in having his hogs properly immunized each year, the farmer would save money in the long run. Mr. Williams also stressed the important relation which the veterinary profession bears to the health and safety of our vast live stock resources.

We heartily commend and endorse publicity of this kind. It is in line with other forms of ethical publicity, the need of which is just beginning to be appreciated. It all helps. It starts the employers of veterinary services thinking in the right direction, and does much to counteract the unfavorable publicity given the profession in certain parts of the country during recent years.

POLK COUNTY COURT HOUSE, DES MOINES

PROGRESS IN FOOT-AND-MOUTH DISEASE ERADICATION

No new cases of foot-and-mouth disease have appeared since March 22, in the three counties, Solano, Contra Costa, and Alameda, where the outbreak first occurred, showing the effectiveness of the stringent measures used in combating the highly contagious foreign plague.

Curiously enough, however, on March 23, the disease made its appearance in the open range country of Merced County. How the disease jumped over two counties and landed 90 or more miles away had not been determined at last reports, but it was believed that the infection had been carried by birds. This is the first time that foot-and-mouth disease has gained access to cattle on the range.

The seriousness of this new development was made immediately apparent, and at the request of G. H. Hecke, Director of the State Board of Agriculture of California, who advised the federal authorities that his force of state veterinary inspectors was insufficient, the Bureau of Animal Industry increased its force from 77 to 105 men on March 29.

Dr. U. G. Houck, of Washington, D. C., was sent to the battle zone to act as the personal representative of Secretary of Agriculture Wallace and Dr. John R. Mohler, Chief of the Bureau of Animal Industry. Dr. Houck is acting in an advisory capacity to the State officials and is assisting Dr. Rudolph Snyder, veterinarian in charge of the Federal field force.

One of the very serious incidents in the course of the outbreak was the shipment of infected cattle from Merced County to the Los Angeles stockyards, the presence of the disease not having been detected before the cattle were shipped. Some of the same cattle found their way to San Francisco and Stockton, leaving a trail of infection behind. Los Angeles stockyards were immediately ordered closed and disinfected.

Up to April 18, sixteen counties had been quarantined, ten of these having contained actual infection.

A new factor in foot-and-mouth disease eradication recently developed, namely, the restriction of the movements of human beings, in other than actually infected territory. This came to a head, on the California-Arizona border, at Yuma. Arizona has passed regulations forbidding automobile tourists from California to enter Arizona. The movement of tourists on railway

trains has not been interfered with in any way. Several other states have passed quarantine regulations of various kinds against live stock and live stock products coming from California.

A. V. M. A.

President Stange has announced the following appointments as Resident Provincial Secretaries: Dr. R. A. McIntosh, 84 Forbes Avenue, Guelph, for Ontario and Dr. Adam T. McLean, of Moncton, for New Brunswick.

COMING VETERINARY MEETINGS

North Louisiana Veterinary Medical Association. Hospital of Dr. B. G. Bryson, Shreveport, La. May 14, 1924. Dr. L. H. Bennett, Secretary, Monroe, La.

Central Michigan Veterinary Medical Association. Jackson, Mich. May 21, 1924. Dr. W. N. Armstrong, Secretary, Concord, Mich.

Massachusetts Veterinary Association. American House, Boston, Mass. May 28, 1924. Dr. C. H. Playdon, Secretary, Reading, Mass.

California State Veterinary Medical Association. Pasadena, Calif. June 2-3-4, 1924. Dr. J. P. Bushong, Secretary, 414 No. Larchmont Blvd., Los Angeles, Calif.

New York State Veterinary Medical Society. (Joint meeting with Eastern States Tuberculosis Eradication Conference.) Albany, N. Y. June 10-11-12, 1924. Dr. C. E. Hayden, 110 Irving Place, Ithaca, N. Y.

Arkansas Veterinary Association. Marion Hotel, Little Rock, Ark. June 21, 1924. Dr. Joe H. Bux, Secretary, Old State House, Little Rock, Ark.

North Carolina State Veterinary Medical Association. Blowing Rock, N. C. June 25, 1924. Dr. J. P. Spoon, Secretary, Burlington, N. C.

Michigan State Veterinary Medical Association. East Lansing, Mich. June 24-25-26, 1924. Dr. E. K. Sales, Secretary, East Lansing, Mich.

Missouri Veterinary Medical Association. Excelsior Springs, Mo. June 25-26, 1924. Dr. Fred C. Cater, Secretary, Sedalia. Mo.

Illinois State Veterinary Medical Association. St. Nicholas Hotel, Springfield, Ill. July 9-10, 1924. Dr. L. A. Merillat, Secretary, 1827 So. Wabash Ave., Chicago, Ill.

Kentucky Veterinary Medical Association. Frankfort, Ky. July 9-10, 1924. Dr. J. A. Winkler, Secretary, Newport, Ky.

STERILITY IN MARES[1]

By W. W. Dimock *and* E. A. Caslick, *Lexington, Ky.*

Department of Veterinary Science, Kentucky Agricultural Experiment Station, University of Kentucky

For many years the breeding of light horses, the Thoroughbred and standard-bred, has been a leading industry in Kentucky, and particularly in Central Kentucky, commonly known as the "Bluegrass Region." Men who have been actively engaged in the breeding of horses for nearly half a century state that infections and diseases of the reproductive organs of mares and stallions and the common ailments of the new-born were practically unknown to them in the early days, at least as an important economic factor. In more recent years, the number of mares which have failed to breed, the number of stallions that have proved to be impotent or shy breeders and the diseases of the new-born, not to exclude outbreaks of contagious abortion, have all been very noticeably on the increase.

Previous Investigational Work

Prior to the beginning of an investigation on "The Pathology and the Bacteriology of the Reproductive Organs of Mares and their Relation to Sterility," investigators at the Kentucky Agricultural Experiment Station had made two important and significant contributions on breeding problems pertaining to horses. First should be mentioned the work on contagious abortion of mares, by Prof. E. S. Good.[1] This work was undertaken in 1907, and, after a number of years of careful investigation, the specific etiology was established (*Bacillus abortivo-equinus*) and successful preventive measures were formulated. The other contribution was that of Prof. W. S. Anderson,[2] on impotency in the male, undertaken in connection with his studies in genetics and animal breeding.

It was found, however, that after the problem of contagious abortion in mares had been solved, at least in a practical way, and after the elimination of certain males that were recognized as being impotent, there still remained problems in breeding so extensive and serious as to warrant further active investigation. Among these problems, the outstanding one was sterility

[1]Presented at the sixtieth annual meeting of the American Veterinary Medical Association, Montreal, Canada, August 27-31, 1923.

in mares. Less frequent, but of equal or greater importance, when considered individually, are to be mentioned such conditions as sporadic cases of abortion, the loss of foals from diseases of the new-born and the factors pertaining to impotency in stallions.

When planning the investigation, it was not intended to undertake the treatment of barren mares nor of impotent stallions; it was found, however, that in the majority of cases, it is not a particularly difficult problem to make a diagnosis as to the general nature of the various causes of sterility in mares or to determine that a stallion is impotent, but that the question of correcting these conditions is all important, and further, that undoubtedly there is an important connection between certain cases of abortion, diseases of the new-born, impotency in stallions and sterility in females, due to infections of the genital tract. The relationship between some of these conditions has been quite uniformly supported by both field and laboratory findings. The material available for examination has clearly demonstrated that something more substantial and far-reaching than a laboratory diagnosis is needed, if fundamental, practical and constructive suggestions are to be made as to how these problems may be best dealt with.

The Present Problem

During the last three years, considerable time has been devoted to the clinical study of sterility in mares and to carrying out various lines of experimental treatment in an attempt to overcome or correct the various types of sterility met with in mares. This has necessarily delayed much of the work planned in some of the more technical phases of the subject, particularly the microscopic pathology.

As a result of our clinical work on sterility in mares, various points of vital importance have been brought out. Many of the abnormal conditions encountered upon clinical examination have been fully confirmed by laboratory tests and, when taken together, emphasize that for the control and prevention of genital infections there is a very great need for the adoption of a far more definite plan for the supervision of mares and stallions maintained for breeding than has ever yet been undertaken.

This report covers the clinical examination of four hundred twenty mares; a study of the bacterial flora of the cervix and

uterus of three hundred nine; the postmortem study of the reproductive organs of twenty-one mares; cultural work on the semen of thirty-six stallions; postmortem examination of twelve fetuses and nine foals and observations on hundreds of brood mares classed as regular breeders.

Of the four hundred twenty mares examined clinically, twenty-eight were found to be pregnant. Thirty-seven were so-called "maiden mares," fifteen were young mares that had been bred one or more years but failed to conceive, the remainder, three hundred forty, were mares that had foaled at least once but had been barren for one, two, three or more years. The cause of barrenness was quite evident in many of them, while in others there was no apparent reason for their failure to conceive.

For convenience of discussion, the mares studied have been divided into six groups. After further study of the causes of sterility, it is quite probable that some change will have to be made in this classification. However, some of the conditions are very distinct, and it is not anticipated that further investigation will necessitate any material change for them.

TABLE 1. GROUPING OF MARES EXAMINED

	Total No. of mares of both classes	Mares barren one season or more	Maiden mares
Number of mares examined	420	355	37
Group I. Pregnant mares	28	..	..
Group II. Mares apparently normal	77	61	16
Group III. Miscellaneous mares	76	76	..
Group IV. Mares with small ovary	74	53	21
Group V. Mares with cystic ovary	14	14	..
Group VI. Mares with uterine infection	151	151	..

Group I. Mares found upon clinical examination to be pregnant.

Group II. Mares apparently normal, as determined by clinical and bacteriological examinations. Seventy-seven mares are included in this group, sixteen "maiden mares" and sixty-one that have been barren for one or more years. Many of the sixty-one are probably mares that will later conceive without treatment, and are what the breeders call normal irregular breeders.

Group III. Mares showing general atony of the genital tract. Of the seventy-six included in this group, the majority were aged mares. However, they were free from infection of the genital tract, and at least one ovary was sufficiently normal

in size and consistency as to indicate no functional disturbance.

Group IV. Mares with small ovaries. All the mares included in this group were found upon clinical examination to have ovaries not over one-half normal size, many no larger than the average pecan nut and very hard. Twenty-one of the seventy-four in this group were "maiden mares," ranging in age from three to five years.

Group V. Mares with cystic ovaries. The ovaries of the fourteen mares included in this group range from slightly above normal to twice normal size. Most of the mares in this group were from nine to fifteen years of age. A few had never had a foal, others had had one or more foals but had been barren for several years. In some cases the condition of the ovaries indicated small, multiple cysts, while in others one or more large cysts were present.

Group VI. Mares carrying uterine infection. The presence of cervicitis and metritis was evident in the majority upon clinical examination, and was confirmed upon bacteriological examination in all cases. The clinical pathology varied from a mild endocervicitis and endometritis to pyometra. The one hundred fifty-one mares included in this group were of all ages, the majority being old. A few had become infected following their first foal.

The first criterion in all work on sterility in females is the determination of pregnancy. The accompanying chart shows that out of four hundred twenty mares presented for examination, twenty-eight were found to be pregnant. It is a great satisfaction to the owner, also to the one making the examination, to find a supposedly barren mare pregnant. Occasionally one will find pregnancy in a mare which the owner feels confident is barren. Therefore, while we have made no special study of the signs of pregnancy in mares, the following brief statement on pregnancy in mares would seem to be in order.

Examination for Pregnancy

All examinations for pregnancy in mares should be made with great care. When possible, the mares to be examined should be fasted for at least twenty-four hours before the examination. This helps materially to reduce the size and change somewhat the position of the pelvic flexure of the large colon and thus greatly facilitate the operation.

When preparing a mare for examination, confine her only to

such a degree as will protect the examiner. The breeding hobbles are the most common and most satisfactory means of confinement. Some mares object to the use of hobbles, and for such cases the twitch and a reliable attendant to hold up one of the fore feet will suffice.

It is always advisable to make the rectal examination first. There seems to be less danger from the rectal than from the vaginal examination. Most pregnant mares will offer less resistance to the rectal examination, and if pregnancy can be definitely determined, the vaginal examination may be omitted.

Most of our examinations for pregnancy have been made in the late fall or early winter, never earlier than the fourth and often as late as the sixth or seventh month following the termination of the breeding season, and in the very great majority of cases it has been possible to diagnose pregnancy from rectal examination alone.

Signs of Pregnancy in Mares

The indications of pregnancy in the mare are in general the same as those for cows. The uterus is terraced more and the fetus in most individuals is carried high in the abdominal cavity. Therefore, as a rule, it is much easier to palpate the fetus in mares than in cattle. Occasionally mares will strain and force the bowel back so violently that it is almost impossible to palpate the uterus with any degree of accuracy. In such cases, and in all others where there is doubt following the rectal examination, a vaginal examination should be made. Before making the vaginal examination, the external genitals should be washed thoroughly. The vaginal canal may be inspected by the use of the speculum or by the hand. In either case, the signs of pregnancy are the closure of the os uteri and the presence of a uterine seal. The uterine seal in mares is a white or grayish white, exceedingly gummy secretion having very much the consistency and character of white library paste.

In every instance, palpation of the uterus and uterine artery per rectum, together with examination of the os uteri, has enabled us to make a diagnosis of pregnancy. The occurrence of estrual periods, changes in the ovary, etc., have not been taken into consideration; neither has any attempt been made to determine the age of the fetus at the time the examination was made.

Because our work has been limited very largely to barren

mares, we have not come in contact with those acute inflammatory conditions which accompany or follow parturition and dystocia. The various forms of inflammation of the genital tract listed below are those that have been met with in our work on sterility in mares.

1. Vulvitis
2. Vaginitis
3. Cystitis
4. Acute endocervicitis
5. Acute endometritis
6. Chronic indurative cervicitis
7. Chronic cervicitis and metritis
8. Pyometra
9. Cystic degeneration of the uterine wall
10. Salpingitis
11. Ovaritis
12. Ovarian tumors.

Vulvitis: Many such cases resulting from injuries received during parturition and mechanical injuries in cases of dystocia are not uncommon in brood mares. Inflammation of the vulva has been most commonly observed as a secondary lesion to chronic uterine infection, especially to streptococcic metritis. The constant irritation of the membrane from the passage of infected exudates from the vagina and uterus sets up a mild inflammation. The membrane of the vulva in such instances will bleed from the slightest manipulation.

From the clinical appearance, there seems to be a constant desquamation of the surface cells and proliferation of the underlying structures. The desquamated areas finally tend to fill in with cicatrical tissue, and in many cases the proliferation has been sufficient to cause a slight protrusion along the lateral borders of the lips of the vulva.

Six mares that had suffered from a rupture of the vulvar sphincter muscle at the superior commissure were studied. The extent of these ruptures varied; some were two inches in length, often deviating to some extent around the anal sphincter muscle. A rupture at this point, unless surgically corrected, apparently always results in a decided gaping of the parts, thus forming a more or less direct open passage into the vaginal cavity, making the genital tract less impervious to the entrance of foreign material and bacteria.

All these mares were found to harbor a variety of micro-organisms in the genital tract. *Streptococcus genitalium*[3] was isolated from every case. It may be possible that some of these cases carried infection in the genital tract prior to parturition. One mare which suffered from dystocia at the time of foaling in 1922, was cultured soon after parturition and was found to be infected with a streptococcus. From the clinical picture of this case it does not seem possible that she could have acquired the infection at the time of parturition. However, all were dystocia cases, the foals were normal in every case and the mares later failed to conceive. Infection probably took place at or some time following parturition, and the gap in the vulva served as a direct predisposing cause.

Cystitis: This was observed in only one mare. The case was diagnosed originally as nephritis and cystitis, in 1919; the mare was barren in 1920, but showed no evidence of genital infection; had a normal foal in 1921; barren in 1922, at which time clinical evidence of cystitis was decidedly more marked. In the spring of 1923, cervicitis and metritis were found to have developed. The mare was destroyed, and, upon postmortem, cystitis, ureteritis, nephritis, vaginitis, cervicitis and metritis were found to exist. *Streptococcus genitalium* was isolated from both the genital and the urinary tracts.

Vaginitis: It is occasionally observed as an independent condition, usually in a mild chronic form. Exudation is slight, and under proper treatment recovery is prompt. Vaginitis in association with cervicitis and metritis is very common, the most severe cases being observed in connection with streptococcic infection of the genital tract and metritis due to infection by *Bacillus pyocyaneus.* The vaginal cavity is so constantly irritated from the presence of infected exudate from the cervix and uterus that it is practically impossible to judge exactly the extent of the inflammatory process in the vagina. It would seem, however, that the deeper tissue of the vaginal wall does not often become involved; in other words, that the inflammation is purely superficial and, upon correction of the cervicitis and metritis, the changes in the vagina rapidly disappear and the organ becomes normal.

Acute endocervicitis and endometritis: These conditions, as well as cervicitis and metritis in the mare, are almost inseparable. They are, in general, co-existent. The inflammatory changes resulting from infection of the cervix and uterus vary greatly,

probably always starting as an acute endocervicitis and endometritis. In some cases, exudation is not a prominent feature of the inflammatory process; however, in cervicitis and metritis, due to streptococcic and *Bacillus pyocyaneus* infection, the glands of the cervix and uterus are very active, secreting constantly a large amount of a serous or sero-mucous exudate, containing leucocytes, epithelial cells and occasionally red blood corpuscles.

The mucous membranes in acute streptococcic infection are changed but little to tactile impressions. The appearance of the mucosa varies greatly in individual cases, and also with the period at which the examination is made. Some show congestion of the mucous membranes of the vagina, cervix and uterus, while others are congested only to a slight degree.

In acute or recently infected cases, the cervix and uterus appear to remain in very good condition. The cervix is only slightly dilated, and the contraction and tone of the uterus remain in most cases very good. Inflammatory adhesions in the cervix and in the uterine wall, just inside the cervical canal, may be found in both acute and chronic cases.

Chronic indurative cervicitis: Cervicitis of this form has been encountered in a few cases only. It was found accompanying metritis due to infection of long standing. One mare was suffering from streptococcic metritis, while from the other cases the micro-organisms isolated were not identified. The cervices in these cases were of nearly twice their normal length and more than double in thickness. The cervical canal was often tortuous and the folds were very pronounced. These cases were studied clinically, with the exception of one with streptococcic infection.

Pyometra: This condition in the mare is not common, only two or three cases having been encountered during this investigation. In all of these cases the os uteri was closed, due to the formation of inflammatory adhesions in the cervix. The anatomical nature of the cervix in mares is such as to permit the expulsion of any exudate forming in the uterus. In cases of genital infections it is apparently true that cervicitis usually precedes metritis or occurs simultaneously with it, and the cervix has a tendency to undergo marked dilatation, thus favoring the prompt elimination of all inflammatory exudates. It is only in cases of long standing and complete closure of the os uteri, by inflammatory adhesions, that pyometra has a tendency to develop.

Cystic degeneration of the uterine wall: It is not uncommon to find a barren mare in which the genital tract is apparently free from infection and clinically showing no marked evidence of disease except that the uterus is larger than normal, the walls are thick, the whole structure soft and boggy. Uteri of this kind are usually first detected from rectal examination, and it is only in the most extreme cases that the condition would be recognized by manual examination through the vagina. In two or three of the mares that were killed for postmortem study, uteri of this kind were found. Upon cutting the uterus open, the organ has the appearance and consistency of jelly or a sponge saturated with water. Closer examination shows that the mucous glands have undergone cystic degeneration. The cysts are usually small, close together and have in general the shape and position of the mucous glands, the surface membrane being somewhat moist and glistening. Occasionally the small cysts become confluent.

Salpingitis:· Inflammation of the fallopian tubes appears to be rare in mares. We have never been able to recognize this condition upon clinical examination. Out of twenty-two mares killed, many of which were affected with chronic cervicitis and metritis, culture media inoculated from both tubes, in every case except two, remained sterile. In these two cases a considerable quantity of mucus was found in the fallopian tubes. Cultures made showed *B. coli* from both the right and left tubes in one case, and *M. pyogenes albus* from the right tube of the other case. The character of the exudate did not seem to indicate a condition of long standing, neither was there evidence of inflammatory changes in the wall of the tubes. It would seem from our observations, both clinically and upon postmortem examination, that in cases of uterine infection in mares there is little or no tendency for the infection to extend up into the fallopian tubes.

Ovaritis: Inflammation of the ovaries has never been encountered in our clinical work or on postmortem examination. Occasionally a mare receiving ovarian massage will indicate, by her actions, an increased sensitiveness of the ovary, suggesting that the massage has been the cause of bringing about some slight inflammation. Reports on two mares that had been receiving ovarian massage stated that the ovaries became somewhat enlarged and exceedingly sensitive to the touch; so much so that the massage had to be discontinued, and in one

case it was several months before the ovary returned to its normal size and the acute sensitiveness disappeared.

Ovarian tumors: In the more than four hundred mares which we examined during the last year, only one ovarian tumor was encountered. In this case the ovary was five or six inches in diameter. The opposite ovary was not more than one-fourth normal size and was very hard. The diagnosis of ovarian tumor was based on the size and consistency of the ovary. In another mare, a large ovary was encountered, and for a time was considered as a tumor. Later, this mare was examined, and the ovary found much reduced in size. It is therefore believed that the enlargement of the ovary in this case was due to cysts, and that the cysts had ruptured.

Parovarian cysts have been found in several mares; these were easily ruptured, and, upon subsequent examination, had not re-formed. Conditions such as hydrometra; septic metritis, metroperitonitis and allied conditions have never been met with in our work on sterility in mares.

Of the one hundred fifty-one mares carrying infection in the genital tract, seventy-one have been cases from which various organisms have been isolated, many of which have not been identified, but no one micro-organism predominated in any number of cases. This class of mares shows as a rule no external symptoms of uterine infection. Upon examination of the vagina and cervix, many had a slight endocervicitis and metritis. In others, a more severe endocervicitis and metritis were present, making it very evident, upon clinical examination, that they were harboring micro-organisms in the genital tract; while still others, from which organisms were isolated, appeared normal, and a diagnosis of uterine infection could not be made until the mare had been cultured and laboratory reports obtained.

In this large list of seventy-one mares carrying infection, there appears to be no clinical picture that would differentiate one case from another, the conformation, tone and general appearance of the cervix and uterus being normal in most cases. There was very little increased activity of the glands of the cervix and uterus. The external genitals are usually clean, and in a few cases only was there found a slight amount of a thick, gummy, purulent exudate in the vaginal cavity. Where inflammation was observed in these cases it was usually subacute.

Bacillus pyocyaneus was isolated from the cervix and uterus of six of the one hundred fifty-one mares. From five it was

obtained in pure culture. In one case, following treatment and disappearance of the bacillus, a streptococcus was obtained.

The clinical picture presented by the presence of *Bacillus pyocyaneus* in the genital tract of mares is in many respects similar to that of streptococcic infection. The external genitals, tail and inner parts of the thigh are usually soiled with a discharge. Upon examination of the genital tract, a small quantity of a slightly greenish muco-purulent exudate in the vagina and uterus is found. This exudate varies in form and consistency in the different cases and at different periods in the same case. During the estrual period, it approaches more of a sero-purulent exudate, and during the anestrum it becomes less fluid and more purulent in nature.

By far the most serious type of cervicitis and metritis encountered during this investigation has been that caused by *Streptococcus genitalium*. Eighty (52.9%) of the one hundred fifty-one mares found to be carrying infection in the genital tract were infected by this organism. From data already on hand, it appears that this organism may be present in the uterine cavity for some time without any material effect upon the breeding efficiency of the mare. However, it finally always becomes firmly established, and the changes produced are sufficient to cause sterility.

Many Cases Chronic

A large percentage of the cases which were encountered at the beginning of this investigation were chronic cases of long standing. Some of the more valuable animals had been under treatment for as long as five years. These cases, as a whole, are not very difficult to diagnose. They present a picture which is not duplicated by any other form of uterine infection that has been met with, the nearest approach being the few isolated cases of *B. pyocyaneus* infection mentioned above.

In the spring or foaling season of 1923, a relatively large number of recently infected cases came under observation and afforded an opportunity to study streptococcic infection in its early stage, at least before any marked structural change had taken place in the genital tract. It would seem that infection may be present in the genital tract for some time without causing any appreciable disturbance, or pathological changes may take place rather early. There are many points in this connec-

tion that require much detailed study before definite conclusions can be drawn.

The clinical picture varies somewhat in individual cases, and also according to the time at which examination is made. However, recently infected cases, as a whole, present a rather typical clinical picture which is that of a very slight, acute endocervicitis and endometritis. The os uteri is congested, moist and not as firmly closed as in normal mares. The secretion is usually serous in nature, slightly viscid and opaque. The cellular content is limited almost entirely to a few leucocytes. Infected mares show a hypersecretion during the estrual period, while in the same mare, during the anestrual period, the secretion may subside.

Mares that have recently foaled usually show an abundant secretion for several weeks following parturition; and some may gradually return to an apparently normal condition, while others become progressively worse, and within the course of a few months take on the characteristics of chronic cases. This variation is probably due to the fact that, in the latter case, infection has rapidly gained a foothold in the uterus or has been present for a longer time without having produced any noticeable changes. A few mares showing streptococcic infection following foaling were bred on the ninth day or at subsequent estrual periods, and from information now available some of them are in foal. It has been our experience that the micro-organism is more easily recovered from the exudate of acute cases than from the exudate of chronic cases.

Bacteriological Diagnosis Desirable

The clinical diagnosis of acute streptococcic endocerviticis and endometritis must always be confirmed by a bacterological examination. Where the clinical picture suggests streptococcic infection, negative bacteriological findings should not be accepted as conclusive, because experience has shown that it is often necessary to take cultures a number of times and at different periods before the organism will be recovered.

Chronic cervicitis and metritis, due to streptococcic infection, present a very typical pathological picture. The tail, inner parts of the thigh and vulva are generally contaminated with exudate. Upon examination of the vagina, cervix and uterus, a variable quantity of sero-purulent, slightly milky exudate is found in the phlegmatic genital tract. A microscopical examination of

this exudate has in every case revealed the organism, although in many instances it has not been obtained on the first examination. One mare in particular, which presented a typical clinical picture of streptococcic infection, was cultured five times before the streptococcus was recovered.

The exudate contains a great variety of cellular elements: polymorphonuclear, small and large mononuclear leucocytes and epithelial cells, together with a mass of tissue debris. Inflammation is evident from the vulva to the horns of the uterus. Vulvitis and vaginitis develop from the constant irritation of the exudate. The cervix is greatly dilated, often sufficiently to permit the passage of the hand. Its conformation is completely lost, so that it exists as a mere membranous border to the uterine cavity. In those cases where the uterine wall remains fairly well contracted, the exudate is apparently forced out or is cast off by the movements of the mare, so that no great quantity is present at any one time. In old mares, and particularly those in which the uterus has become dilated and paretic, the exudate tends to accumulate in both the uterine cavity and in the vagina.

In cases of long standing most of the folds have completely disappeared, the mucosa over large areas is completely denuded, and such areas are filled in with cicatricial tissue and are very sclerotic. In one case the proliferation of tissue and the organization of exudate had resulted in the formation of a well-organized false membrane over the body of the uterus. In those cases where the uterus was enlarged, the walls were very thin, flaccid, atonic and pendulous, and the quantity and character of the exudate was such as to produce pyometra.

Pathological Changes

In three cases, the os was found completely closed through inflammatory adhesion, and the uterine cavity full of pus. Sections of uteri from mares suffering from chronic streptococcic infection show, upon microscopical examination, degeneration of the mucous glands along the uterine mucosa. In many places the lining membrane had disappeared completely, and over these areas there is evidence of proliferation of the underlying structures. The surface of the uterine wall is covered by a seromucous exudate, in which are found various leucocytes and epithelial cells, red blood corpuscles and tissue detritus. In the submucosa and deeper structures of the wall of the uterus are

found degenerated mucous glands, cellular infiltration and hemorrhage.

The physical condition of mares seems to be little affected even in the most severe cases of uterine infections. In a few cases of chronic streptococcic metritis the mares are often not wholly thrifty during the winter months, the coat may be rough and they fail to shed as early in the spring as normal mares.

A maiden mare, bred in the spring of 1922 and examined in the winter of 1923, was found to be suffering with streptococcic metritis. Another maiden mare, bred in the spring of 1922, gave birth to a normal foal in 1923, failed to conceive at the first service, ninth day, and at second service, nineteen days later, was examined and found to harbor *Streptococcus genitalium* in the uterus. These and many other cases of a similar nature seem to be sufficient evidence that the stallion may infect the mare at time of service. It would also seem quite probable that mares bred on the ninth day following parturition are far more susceptible to infection than at any other time.

Treatment of Uterine Infections

The tunica albuginea of the ovary in the mare is a dense, tough structure, and, except occasionally, it is practically impossible to rupture the cysts until after many trials. Surgical interference by the operation of puncture or oophorostomy would seem to be indicated, but as yet the operation has not been tried. Glandular extracts have been used on a number of mares where ovarian trouble was apparently responsible for the sterility. In the case of cystic ovaries their value is as yet undetermined. In young mares with small, undeveloped ovaries, their use in conjunction with ovarian massage seems to have been of value.

The treatment of mares for uterine infections has been one of our most serious problems. While it is always possible and easy to introduce medicines into the uterine cavity of mares, yet the sensitiveness of the tissues makes exacting precautions necessary. The tissues of the mare apparently are not as resistant to infection as those of other species and are more easily injured. In general, antiseptic solutions must be from one to two per cent weaker than those commonly used in cattle. Response to treatment is always slow.

The frequency of treatment necessary to overcome uterine

infection depends upon the nature of the case. Experimental treatments were given once a week, twice a week and every other day. For streptococcic metritis, treatments once a week were not often enough; where mares were treated every other day it was apparent from the results that the infected tissues were injured by the too frequent manipulation and use of antiseptics. Treatments given twice a week gave the best average results.

The following preparations have been used for uterine infections: Acriflavine, one part, and proflavine, four parts, in aqueous solution of 1-3000; lysol, ½ per cent aqueous solution; therapogen, ½-1 per cent aqueous solution; sterilac, ½ per cent aqueous solution; water-soluble iodin, ½ per cent aqueous solution; mercurochrome, ½-1 per cent aqueous solution; boric acid, saturated aqueous solution; argyrol, 5-10 per cent aqueous solution, and sterile normal salt solution. Besides the douches, Lugol's solution, 1-2 per cent in liquid petrolatum, and iodoform, 10-30 per cent in liquid petrolatum, were used; also uterine capsules of boric acid.

Treatment With Yeast

The so-called yeast treatment was given a considerable number of mares; two ounces of fresh compressed yeast in capsules were introduced into the uterine cavity twice a week for several weeks, followed by douching with normal salt solution. Antiseptic uterine douches and antiseptic suspensions in oil proved adequate for the treatment of most uterine infections in mares. Many cases of streptococcic metritis showed marked improvement after consistent treatment. However, others were found, upon bacteriological examination, still to harbor the organism, after having been under treatment for six months to two years.

Bacterins have been used extensively on many cases; during the winter of 1921-1922, so-called mixed bacterins were used on mares showing uterine infections. The mixed bacterin was composed of streptococci, *B. coli communis* and various micrococci and rods belonging to the colon-typhoid group. During the winter of 1922-1923, autogenous bacterins were used almost exclusively. Most of the bacterins were in strength of 20,000,000,000 per cc, and were used in doses graduated from 2-10 cc, given once or twice each week.

In a few cases of streptococcic metritis, an antistreptococcic

serum produced at our laboratory was used. The dose was from 100 to 200 cc, given intravenously, each mare receiving a total of at least 500 cc. All bacterins were used in conjunction with other treatments. Mares showing uterine infection by various organisms belonging to the colon-typhoid group and *Bacillus pyocyaneus* were apparently benefited by the use of bacterins. Streptococcic bacterins and antistreptococcic serum used on mares with streptococcic metritis were apparently of little or no value.

Glandular extract (Synergin No. 6, Beebe) has been used quite extensively on mares with uterine infection and atony of the uterus. Its value for such cases has not been especially apparent. When used on mares with retained placenta, or where there was delayed involution of the uterus following parturition, it has apparently given excellent results.

From a review of the accumulated data on the frequency and character of uterine infection in the mare, the sources and origin of infection become an exceedingly important problem. Many of the micro-organisms isolated from the genital tract of all species of animals are found abundantly in external nature. Others, so far as known, are dependent upon contact with the animal body for their existence. Genital infections dealt with in this paper are probably not transported through the digestive tract and systemic circulation to the uterine cavity; but on the other hand, the very great majority of bacteria found in uterine infections enter the uterine cavity through the external genital canal. Cases of uterine infection coming under our observation have the following histories: dystocia, imperfect parturition, injuries at the time of parturition, rupture of the vulvar sphincter muscle, retention of fetal membranes, failure of prompt involution of the uterus following foaling, improper douching following parturition, dilatation of the os uteri by attendants at the time of service, artificial impregnation and insanitary breeding conditions, including both surroundings and insanitary handling of the mare and stallion. All of these conditions favor the entrance of bacteria into the genital tract of mares or predispose the mare to infection.

Streptococcus genitalium was recovered from the semen of thirty-four out of thirty-six stallions cultured and, in every case, various other micro-organisms. Granting that the technique of culturing the semen of stallions has not been perfect, it is nevertheless apparent that *Streptococcus genitalium* and

many other micro-organisms are present, either in the semen of the stallion or on the external genitals, and that their transmission to the genital tract of the mare is a possibility at every service. That the stallion does not infect every mare served is quite apparent. However, there is ample evidence to prove that he may be a serious source of infection.

Treatment of Ovarian Trouble

The treatment of mares for ovarian trouble and for uterine infections has been carried out on as systematic a plan as possible, in order to determine what methods are best suited for the correction of these conditions, and especially what agents are most efficacious in uterine infections. In young mares, with small, hard undeveloped ovaries, the response to massage has been prompt, and from *results already observed*, such treatment has been exceedingly beneficial. For cystic ovaries the response to massage has not been all that was anticipated. In a number of cases in which small, multiple cysts are present and the ovary is large, hard and tense, massage has failed to give relief. Where there are one or more large prominent cysts, massage has been beneficial in only a few instances.

What may result from the insanitary handling of stallions and mares during the breeding season is well illustrated in the following instance. During the spring of 1922 the conditions under which mares were bred and the method of artificial impregnation were observed in a stud of approximately thirty mares. Carefully laid plans, carried out deliberately for the spread of infection, could have been no worse. In this same stud, in the spring of 1923, three or four mares aborted, four colts died following birth, from navel ill, joint ill, etc., and several colts showed clinical symptoms of disease but recovered.

The Prevention of Genital Infections

What may be accomplished in the way of preventing genital infections during the breeding season is also well illustrated by the following instance. The owner of one of the largest studs in Kentucky put into practice every known precaution for the prevention and control of genital infection during the breeding season of 1922. Most of the actual preventive measures were carried out by or under the direction of the owner himself. Every mare bred and maintained on this farm during 1922 gave birth to a normal, healthy foal, and not a single mare showed infection in the spring of 1923 that could possibly be traced to

the service of the year before. All the six stallions maintained in this establishment, except one, according to our bacteriological examination, were carrying *Streptococcus genitalium* in the semen. This record would seem to indicate that with the observance of proper sanitary precautions much can be accomplished in the prevention of genital infections in mares.

While the problem of contagious equine abortion is not considered in this paper, nor does it have any direct relationship to the study of sterility in mares, it would seem advisable to mention at this time wherein the problems of contagious abortion, genital infections and sterility over-lap. Contagious equine abortion is recognized as a distinct, independent and specific disease caused by the *Bacillus abortivo-equinus*. The differential diagnosis between contagious abortion in mares and abortion due to other causes is always to be carried out to a definite conclusion. Mares aborting from the action of the bacillus of equine contagious abortion seldom, if ever, suffer from retained placenta or other pathological conditions that later become factors in sterility. The only cases of metritis following contagious abortion that have come under our observation have been in mares that were douched improperly following the abortion.

The fetus from a mare that aborts as a result of contagious abortion will usually reveal the presence of the *Bacillus abortivo-equinus* in various organs and tissues of the body; also the organism may be recovered from the afterbirth and from the uterine secretions. Return of the uterus to normal is prompt. Ten days following abortion, the blood will react to the agglutination and complement-fixation tests. The following season the mare will conceive quite as readily as any normal mare. The gross pathological changes in the fetus and in the afterbirth are characteristic. Contagious abortion of mares may be prevented by immunizing the mare against this bacillus through the use of a bacterin. Contagious abortion usually spreads rapidly among pregnant mares in the stud, and unless active preventive measures are undertaken, a large percentage will abort. Infection takes place through the digestive tract and systemic circulation and probably seldom, if at all, in any other way.

In abortion from streptococcic infection, the streptococcus will usually be found in the tissues of the aborted fetus. Other mares in the same stud are in no danger of becoming infected

from association. The mare always continues to show uterine secretion for a longer time than in the case of contagious abortion. The character of the exudate is quite different and the streptococcus is easily isolated. The mare does not clean up without treatment, and does not, as a rule, get in foal the next year. Her blood does not react to the agglutination or complement-fixation tests for contagious abortion. Infection, apparently, always takes place through the genital tract and never through the digestive tract and systemic circulation.

Therefore, the problem of abortion and sterility resulting from metritis due to streptococcic and other types of bacterial infection which may result in premature expulsion of the fetus is distinct in every respect from contagious abortion except the mere act of abortion. The differential diagnosis is easy and clear cut, and there is absolutely no reason for confusion or misunderstanding regarding the primary cause of these conditions and their absolute differentiation.

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DISCUSSION

CAPTAIN R. A. KELSER: I have been very much interested in Dr. Dimock's paper, because he has had an experience which, in many respects, is similar to one we had in connection with an outbreak of abortion at one of the Army Remount Depots. This outbreak of abortion involved four depots. At one of these four depots, subsequent to the trouble with abortion, there occurred another breeding problem, which was due to a streptococcus, apparently the same organism Dr. Dimock mentioned. I feel, as he does, that equine infectious abortion and this streptococcic condition are in no way directly connected. In our experience this streptococcic infection made its appearance in a stud where equine abortion had previously existed. I don't know just how far Dr. Dimock's work along this line has gone, but I would like to ask whether or not he has found this streptococcic infection more prevalent in studs where they have had trouble with equine abortion.

DR. DIMOCK: We have not observed that there was any connection between the two. I should perhaps qualify that statement to this extent: that in most of the studs that we come in contact with, the mares are immune to contagious abortion. Where we have made these observations the mares have been immunized against abortion during the fall; therefore, we don't see very much contagious abortion, but as I stated in the paper, none of our findings would seem to indicate that streptococcic metritis would necessarily follow contagious equine abortion.

DR. CASSIUS WAY: I have been very much interested in Dr. Dimock's paper, and have had an opportunity, during the past year and a half, to do considerable work with him, and I assure you that the work in the field is most interesting from the standpoint of the practicing veterinarian or the clinician. The clinical picture that Dr. Dimock has described in his paper is very characteristic.

The most important point in reference to sterility in mares is a proper diagnosis. There may be three or four causes for sterility in mares, but a proper diagnosis, as in all cases, is important. Streptococcic infection seems to come from various sources. In one large stud of a hundred mares, the

owner believes now that a considerable amount of infection has been introduced into these remarkable Thoroughbred mares at the time of parturition. The handling of the mares subsequent to foaling and, in many instances where there was a slight retention of the membranes, the work has been anything but clean and satisfactory.

This question is presented: How should these mares be handled at this time? Last spring, Dr. Dimock and I suggested a course of treatment to this breeder, and the other day he told me that there hadn't a man put a hand into a mare after foaling this spring, and in every case the termination of parturition was satisfactory. The mares were bred and apparently, to date, the percentage of conceptions is high. We have recommended, in all cases of retained placenta, the use of a combination of endocrine extracts prepared from the pituitary, thyroid ,adrenal and ovarian glands. The product which we have used in this work is known as Synergin No. 6.

Dr. Dimock referred to impregnation. In draft animals unquestionably impregnation may be of great service in procuring a larger number of pregnancies from a given service. It is customary in Thoroughbred breeding studs for the stallion to serve each mare. Therefore, there seems to be no advantage in artificial impregnation in addition to the normal service. As it is generally practiced by breeders and men who care for stallions, it certainly is a most filthy practice. There is no question but that a large amount of infection is transmitted to these mares in this way. I think that we, as veterinarians, should use our influence to discourage this practice, especially among Thoroughbreds.

Now then, the practice of breeding mares on the ninth day, when the genitals are congested and may not be entirely contracted to normal, presents a most opportune time for infection to develop. If a high percentage of stallions are infected and a low percentage of mares in a given stud are free from infection, the argument is defeated, but nevertheless I think in certain cases that badly infected stallions are a very potent source of infection.

In reference to the treatment that Dr. Dimock has given, so far as my work in conjunction with him is personally concerned, I think that aqueous irrigations or douches of the uterus are not as satisfactory as iodin and oil. I have seen many mares that apparently made a very satisfactory improvement in a short time, treated twice or three times a week. This fall may determine whether that treatment was successful, but I think that iodin and oil is a better proposition generally than copious aqueous douches, unless there may be an extensive pyometra.

CHAIRMAN KINGMAN: I should like to ask Dr. Way the size of the dose of pituitary extract and the frequency with which it is repeated.

DR. WAY: We recommend, in cases where the mare does not clean in a few hours, the use of ten to fifteen cubic centimeters of the combined extracts every hour for three or four hours. One owner of a large stud is of the opinion that next year he will give every mare, whether she foals normally or not, a series of injections of this extract, for the simple reason that in eight or nine days the genitals of the mares treated this spring appeared in such excellent condition for breeding.

CHAIRMAN KINGMAN: I should like to ask Dr. Dimock if there is any relation between outbreaks of influenza in groups of mares and the streptococcic infection of the uterus.

DR. DIMOCK: We have never observed any relationship between these conditions.

CHAIRMAN KINGMAN: It is true that stallions that have undergone severe attacks of influenza are very commonly sterile, is it not?

DR. DIMOCK: I could not say about that.

CHAIRMAN KINGMAN: That has been my experience, in a limited number of cases.

FUNCTIONAL DISORDERS AND THEIR POSSIBLE RELATION TO BREEDINC EFFICIENCY[1]

By CASSIUS WAY, *New York City*

The subject of endocrinology is occupying the attention of many of our leading investigators in medicine. "Functional disorders" are receiving more and more attention from clinicians. In veterinary medicine this subject is being referred to frequently, and the adaptation of researches in human medicine to comparable conditions in our filed of practice is being attempted by many veterinary clinicians. For some years specialists in breeding diseases have administered various endocrine products, usually as extracts of individual endocrine glands or bodies, in an attempt to regulate or correct some specific abnormality. These products have been used in the main without special regard to the influence of one or more of these products upon the other members of the endocrine group, or of the effect of all the members of this group upon the body as a whole.

Some of our best authorities on the subject seem to be agreed that the entire system of ductless glands has a very direct governing effect upon the nervous system, the reproductive system and the processes of metabolism. While I do not for a moment, under any circumstances, wish to convey the idea that I am able to speak as an authority on this subject, about which there seems to be so little definite knowledge, I would like to present the results of a few experiments in the use of some of these mixed gland extracts.

In presenting these few results that have been observed in our practice, I wish to do so without special comment regarding the "why" or "wherefore" of these results and without perpetrating any theories or conclusions whatsoever upon you. I trust that these results may be confirmed by others, and that in the near future we may have additional data that may play a limited part at least in throwing some light on this interesting subject.

It is interesting to recall the struggle for recognition in the cases of the use of quinin in the cure of malaria (many knew that it did it, but how?); vaccination against small pox and typhoid; the use of tuberculin, anti-hog cholera serum and

[1]Presented at the sixteenth annual Conference for Veterinarians, at Cornell University, January 10-11, 1924. Published by special arrangement with the Cornell Veterinarian.

virus, and many other now generally accepted and valuable products.

While there are many who do not believe in anything, others who believe only in the "germ theory," others who feel that all manufacturers are perpetrating only a complete line of "bunk" (that doctors should return to the antiquated customs of "rolling their own pills," concocting their own medicines and throw all biological products into the sewer), there are many clinicians who are looking for results. Owners of valuable breeding animals are primarily interested in reproduction, production or performance and prevention of disease or maintenance of health. The veterinarian who is able to assist toward some degree of perfection in these important phases of reproductive efficiency is doing a real service to the live stock industry and occasionally may "play a return engagement."

In view of the fact that a majority of authorities agree that a definite relationship exists between the entire endocrine system and at least three important functional systems of the body, namely, nervous, reproductive and metabolic, in the maintenance of a systemic balance or equilibrium, we have used in our experiments a mixed product put up by the manufacturers under the name of "Synergins."

I wish it were possible for me to give the exact composition of these products. I would gladly do so were I acquainted with the facts. It is estimated by authorities that the amount of incretion from some of these minute glands is normally almost infinitesimal.

If there is a definite relation between the endocrine system and the three important systems referred to above, when one system is overworked or is required to function more than normally, are the others deprived of their share of these incretions? When a cow is required to make 800 to 1000 pounds of butter fat, when she would make 400 to 500 pounds under natural conditions, is metabolism taking more than its share of endocrine products at the expense of reproduction? When a race horse is kept at high nervous tension and in constant training, does the nervous system require under these conditions more than its share of endocrines and thus explain the low percentage in breeding efficiency in this class of animals? When a pack of sporting dogs are hunted hard and are under constant nervous and physical strain, does this explain the unfavorable results of breeding dogs under these conditions? Future re-

searches may answer some of these questions.

In a kennel of foxhounds of excellent type and maintained under good living conditions from the standpoint of nutrition, healthful food, ample exercise and sanitation, where breeding results in the past had been most unsatisfactory and the owner was hardly able to maintain his pack of hunting dogs, 49 breeding bitches were divided into two groups, 26 in one group and 23 in the other. At the beginning of estrum, the bitches in the first group were injected with 3 cc of the "pregnancy group" (No. 14) three times each week, they were bred on about the ninth or tenth day, and the injections continued for nine or ten weeks. The results were as follows:

Every bitch conceived. One aborted at about seven weeks. It is believed by the caretaker that the predisposing cause in this case was a severe injury. The remainder all whelped good litters, the highest number was 12 and the lowest 7, with an average of 9 pups. Every pup weighed a pound to a pound and a quarter. They were a most uniform, vigorous, healthy lot. Twenty-five bitches whelped 225 vigorous pups.

In the second lot of twenty-three that were not treated, and were handled in every other way the same as the first lot, 7 bitches conceived. The balance either missed or aborted. The highest number of pups was 11 and the lowest 2, with an average of a fraction over 4 to the litter. These were an uneven lot, and several were weak and died. In this lot, therefore, there was less than one-third that conceived, as compared with 100% in the treated lot, the average was 4 plus, per litter, as compared with 9 in the treated group. In the treated group every pup was a good one, while in the untreated group several were weak and the litters were uneven.

The results of this experiment were so satisfactory and the owner so elated that we endeavored to curb his enthusiasm and told him that perhaps it wasn't true. His only reply was, "Pups is pups, and that's what I want." It is quite possible that under less favorable conditions of handling and living that these results might not be obtained. However, had we obtained only half as satisfactory results, the owner would have been well repaid for his efforts.

This experiment is almost identical with the guinea pig experiment and other results of investigation recorded about a year ago, by Shigley, King, and Meck. The results of the guinea pig experiment were as follows:

SUMMARY OF RESULTS OF EXPERIMENT WITH PREGNANCY GLANDULAR GROUP

Eight Virgin Females treated with Mixture of Extracts of Pregnancy Group No. 14		Eight Virgin Females Three treated with Protein Extracts. Five untreated.
100%	Percentage pregnancies	50%
21	Number of feti	6
118.5 gms.	Weight of feti	40.1 gms.
14.8 gms.	Average weight of feti per mother	5.0 gms.
75%	Both horns of uterus pregnant	0
250%	Percentage increase, feti over controls, by number	
188.3%	Percentage increase, feti over controls, by weight	

"A concrete idea of the results secured in the above experiments may be obtained by a glance at photograph (figure 1) of the feti dissected from the uteri of both treated and untreated pigs. Five of the treated virgins produced three feti each. Usually primipara give birth to only one or two pigs.

"The clear-cut, distinctly positive results of the above experiment, in addition to furnishing good evidence that a properly balanced mixture of the extracts of the glands of the pregnancy group may be tested in the laboratory, also clearly demonstrate the practical application of the use of balanced extracts of the pregnancy group of endocrinous glands in clinical work. It is clearly shown that such a preparation exerts a distinctly antagonistic action toward the female sexual maturity group of glands. This conclusion is borne out by the result of clinical work upon cattle which are subject to chronic nymphomania. The use of a balanced mixture of the extracts of the pregnancy group exerts a markedly beneficial action in antagonizing or neutralizing the over-stimulated female sexual maturity group.

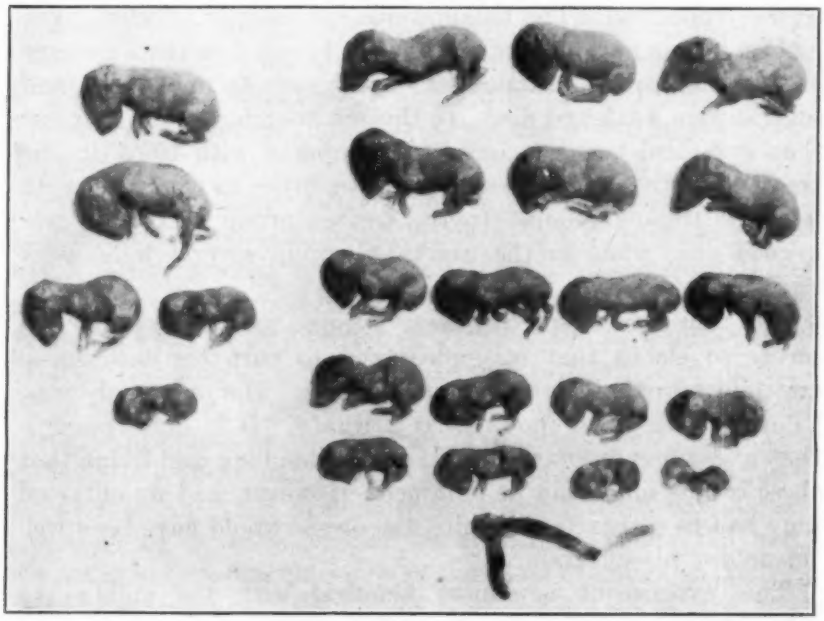

Fig. 1. Feti on left are those from control pigs. Those on right from treated pigs. One fetus omitted from group on left, being too small to be dissected from uterus. Uterus at bottom of group on right contains three feti too small for dissection. (Shigley and Meck: JOURNAL A. V. M. A., lxii (1923), p. 742.)

In cases of cystic ovaries in cows we have treated many individuals with apparent success. There seems to be a very definite relationship between metabolism and ovarian disorders. Cystic ovaries appear frequently in cows doing official registry work. The writer believes this to be due to unbalanced endocrine conditions. In other words, the genitals are not getting their share of endocrine incretions. At any rate many cases of cystic ovaries in cows have responded nicely, the cysts were ruptured, at least 10 to 20 cc of No. 14 was administered three times each week, and the cases settled down to normal. Monthly or semi-monthly examinations were made and cysts ruptured if they developed, and when bred many of these cows conceived on first service.

Too much reliability cannot be placed on this phase of the treatment until more cases are treated. However, our experience leads us to believe that this aid to treatment, in cases of this type, is of much value.

In mares we have had an opportunity to apply these gland extracts to a large number of Thoroughbreds on several large breeding farms. In working with mares, it is essential, if possible, to make an accurate diagnosis of the cause of sterility. Many mares are infected. Dimock and his associates* have made extensive investigations bearing especially on this point. Dimock and the writer recently presented some of these problems in the *Thoroughbred Record*. Endocrine products are apparently of no value, and are not indicated in cases suffering from specific bacterial infection. They are apparently valuable in many instances of mares that appear normal on physical and bacteriological examination. Maiden mares and young mares out of training are usually difficult to get in foal. A majority of breeders consider a 50% foal crop, in this type of mares, a good average. In each of three large studs from 15 to 20 maiden mares were treated. They were given 10-cc injections each week with the pregnancy group of extracts, and in each instance all but one mare or approximately 88% on each farm conceived. This is a considerable increase over the average as observed on many farms. Apparently there is a very beneficial influence on the genital tract of physically normal mares. Just what this influence is remains to be determined. Quite extensive and additional experiments are under way this year, and we trust

*Dimock and Snyder: Jour. A. V. M. A., lxiv (1923), p. 288. Dimock and Caslick: Jour. A. V. M. A., lxv (1924), p. 000.

that the above results may be substantiated this season.

Another interesting phase of our work on horse-breeding farms is revealed in the fact that many mares that suffer from delayed parturition, together with tardy expulsion or retention of the placenta, where attempt at manual removal is practiced, show infection of the uterus, usually streptococcic metritis. An operator may be as careful as it is physically possible to be, in the removal of a placenta, but from the very nature of the operation, the surroundings and the condition of the patient, it is hazardous to introduce the hand and arm into the uterus of a mare, at this time, except as a last resort.

During the past season, on one large farm where there were approximately 100 foaling mares, every mare that showed indications of retention of the placenta (that is, that did not clean in one to two hours) was given the gland extract group consisting of a combination of ovarian, thyroid, pituitary and adrenal extracts, in 10-cc doses, every hour for three doses. As a result, not a hand was put in a foaling mare last season, in every case the placenta was expelled promptly, the uterus involuted back to normal, and the owner reports that these mares took the horse on the ninth day and turned him off. A recent general examination for pregnancy shows practically every one safe in foal.

On account of these quite exceptional results, this large farm, and a few others, are carrying on an experiment this season with all foaling mares as follows: Each mare received 10 cc of these mixed endocrine extracts (No. 6), on the first, third and fifth days after foaling, to assist in involution of the uterus and the expulsion of fluids, exudate or any debris that may remain for a few days after parturition. The results of these experiments will be presented as soon as they are in evidence.

These products seem to have a definite effect on the nervous system of females. The patient becomes more quiet, tends to take on flesh and "settles down." This was especially noticeable in the bitches and the maiden mares. This feature has been especially noticed by physicians in cases of genital disorders in women treated in a similar way.

In males, while the opportunity for observation is much more limited, two interesting cases in stallions are presented. One, a Thoroughbred, and the other, a Percheron, started the season quite normally although rather slow in service. Both horses had plenty of exercise and proper food. About the middle

of the season each refused to serve. Mixed endocrine extracts of the male sexual maturity group (No. 11) were administered, in 10-cc doses daily, for about ten days, and then every other day for the remainder of the season. Both horses returned to normal service with more vigor and potency than before.

In the case of the Thoroughbred, 20 mares were served, one of which was later found to be infected and should therefore be eliminated. Of the 19 remaining normal mares, 18 were found, upon recent examination for pregnancy, to be safe in foal.

With the Percheron it has not been possible to check the results to date in a positive way, due to the fact that the mares are widely separated, usually one or two on a farm, scattered over the whole countryside. However, 30 mares were bred, and to date it is definitely known that 20 are safe in foal. While these two cases are not sufficient from which to draw any definite conclusions, they are simply presented as carrying a slight amount of interest.

In males, as in females, it is believed that a definite diagnosis should always be made if possible. It is not believed that loss of sexual function can be restored by use of these endocrine products. Surgical treatment should be employed wherever indicated. A tendency in these days is to rely too much on a "shot gun" concoction for the cure of all ills. Endocrinology is taking a very definite place in human medicine. Perhaps if animals could talk they would tell us of many ills that now go unobserved, due to the necessity in veterinary medicine of relying upon objective symptoms only. The maintenance of a systemic balance is believed to be important in connection with reproductive efficiency.

DEAN MOORE ON THE MOVE

Dr. V. A. Moore, Dean of the New York State Veterinary College, has been very much on the move lately. He attended a conference at the New Jersey Agricultural Experiment Station, the latter part of March, called for the purpose of considering poultry disease investigations. Several days later he attended a conference in New York City, to consider plans for legislation designed to control rabies. Following this conference he went to Cambridge, Mass., where he delivered two lectures, at the Massachusetts Institute of Technology, on "Meat Inspection in Its Relation to Public Health."

OUR PRESENT KNOWLEDGE REGARDING WHITE SCOURS AND SIMILAR DISEASES IN CALVES[1]

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In all European countries, as well as in the United States, especially there, where cattle raising is an intensive industry, diseases, often of apparently contagious character, are observed in new-born calves. These diseases no doubt play an important economical role, because they frequently are responsible for heavy losses and in some instances, at least temporarily, may prevent cattle raising entirely.

Among the affections of young calves, those with troubles of the intestinal tract are prevailing, and quite commonly they are designated as "white scours."

White scours has been known for a long time; thus, in 1799, the Frenchman Tolney furnished a good description. In the earlier times the disease was generally interpreted as the result of dietetic errors, but Frank, as the first, stated its contagious character. Nocard admitted a relationship between contagious abortion and scours; he believed the latter to be the consequence of the infection of the fetus during gestation. These and similar views prevailed until Jensen (1891) investigated the disease bacteriologically and reported that in the blood, in the internal organs and in the content of the intestines, bacilli could be demonstrated very similar to *B. coli*, an organism at that time little known. With pure cultures of the organism, he succeeded in infecting calves artificially; even very small doses fed in milk were able to produce regularly the typical form of white scours. The subcutaneous administration of the virus resulted in a local inflammation or a rapidly fatal septicemia. Jensen at the same time stated that even in the intestinal content of normal calves bacilli could be found, which scarcely were distinguishable from those isolated in true cases of white scours. The difference seemed to be limited exclusively to the pathogenic behavior of the latter.

Poels, in Holland, gave a description of diseases in young

[1]Read at the Veterinary Practitioners' Week, Davis, California, January 10, 1924.

calves and devoted a large part to the infections called white scours; according to the results of his bacteriological findings, he proposed a classification. As causative agents, this author found *B. coli*, streptococci, *B. pseudo-coli*, *B. pyocyaneus* and *B. bipolaris*.

Further studies of Jensen have shown that not only one form of *B. coli*, but quite a number of similar and nearly related types of *B. coli*, were capable of producing the disease in question. Even *B. aerogenes*, certain types of *B. proteus* and the *B. pseudo-coli* of Poels could be considered as etiologic factors.

These findings have been confirmed by several German authors; some of them stated that the *B. pseudo-coli* or *B. paracoli* (as it was called by Jensen) comprises several different types. Furthermore, according to Italian authors, cocci may cause white scours. More recent observations of Zwick and Jensen show that in rare instances intra-uterine infections with *B. abortus* (Bang) may be responsible for disease and death of the new-born calves. Jensen further admits that an abnormal intestinal flora or a poor and delayed intestinal secretion may favor the development of the disease.

The Clinical Picture

Before we enter into a discussion of the details of the etiology, I should like to give a picture of the clinical appearance and the pathology of the disease. Both the clinical aspect and the anatomical lesions are generally the same, irrespective of the etiology.

The disease begins often a few hours after parturition, most frequently on the first or second day, sometimes after two to four days of life and, in rare instances, later.

At first the affected animals show a certain weakness and trouble in getting up. They lose their appetite; often a rise in temperature and later on intestinal pains and tenesmus are marked. As a rule, a congestion of the mucous membranes, an irregular distribution of skin temperature, an increase of heart and respiratory action are noted. Temperatures up to 41° C. (106° F.), but not infrequently those scarcely higher than normal are observed.

Very acute cases show a progressing weakness, subnormal temperature and death even before diarrhea has appeared. However, the latter symptom is almost constant; the feces being

fluid, of yellowish color, stinking and not infrequently mixed with blood.

In rare instances the symptoms are less characteristic, the infection turning to a more chronic stage with continuous diarrhea, emaciation and exhaustion; even in this stage the appetite may not be lost. The animal dies after several weeks, or recovers slowly and afterwards shows a tendency to develop poorly and to exhibit little resistance toward complications, such as pneumonia and so on. In these chronic cases, the gall secretion often is discontinued, and the feces become white-yellowish, clayey, hence the designation, white scours.

Postmortem Findings

At the postmortem examination, the fatal cases present, as a rule, hyperemia of the mucosa of the fourth stomach, and not infrequently hemorrhagic epithelial defects. The mucosa of the intestines throughout is hyperemic and more or less covered with hemorrhages; the intestinal content is often mixed with blood. The mesenteric lymph-glands are swollen, they appear red and wet; the spleen, too, is enlarged in different degrees. The parenchymatous organs are as a rule hyperemic. Very frequently the causative agents are found in the blood and in the organs, except in infections by *B. proteus* and *B. pyocyaneus*, in which a bacteremia is usually absent.

In paracolibacillosis in new-born calves a marked hemorrhagic enteritis, a pronounced swelling of the spleen and a serofibrinous exudation of the serous membranes of the cavities and of the joints are present. The enlargement of the spleen is well marked in case cocci are the causative agents, while in infection due to *B. proteus* no alteration in the size of the spleen is noted; in the latter cases, the feces are never bloody, but the intestines *in toto* are distended by gas.

The different germs and their frequency in white scours of new-born calves are illustrated by the records of Jensen. He found in 251 cases the following:

118 cases *B. coli* with septicemia
53 cases *B. coli* without septicemia
16 cases *B. paracoli*
3 cases *B. coli* and *B. paracoli* together
18 cases micrococci
11 cases *B. proteus*
1 case *B. abortus*

In 31 cases the cause of death was unknown.

From these records, it is evident that in the great majority of the cases the disease is due to *B. coli*. Escherich found this organism as an integral inhabitant of the normal, suckling baby's intestines; and, as we have already seen, Jensen stated it to be present in the normal calf's intestines. In quite a number of pathological conditions in both man and domestic animals this germ was detected, and it was thought to be a causative factor, especially in intestinal troubles. The investigations of Jensen showed the existence of a great variety of types of *B. coli*. It was therefore not only interesting but important to answer the question, "Can the pathogenic strains by any means be distinguished from ordinary harmless inhabitants of the normal intestines?" The investigations of Jensen in this regard have been taken up by Christiansen. This author first examined 273 pure cultures of pathogenic strains isolated from cases which at autopsy showed typical lesions and the signs of septicemia. The bacteriological studies comprised especially the fermentative behavior toward sugars and their immunologic particularities. In every case examined only one single strain was present; morphologically no differences could be recorded between the different strains. Most of them were slightly motile; the growth on gelatin in all but nine was identical and typical for *B. coli*. The nine latter strains grew more abundantly, more like *B. aerogenes*.

Varieties of Colon Bacillus

With regard to the fermentative power, Th. Smith and Jensen had previously noted a different behavior of various strains of *B. coli*. The 273 strains studied by Christiansen fermented regularly dextrose, lactose, maltose, arabinose, xylose, sorbite and mannite, but according to their fermentative power toward saccharose, sorbose, rhamnose, dulcite and adonite, Christiansen found twelve different types (AI — VI saccharose +; BI — IV saccharose —). These differences in the fermentative power could not be correlated with other biological activities; in fact, there is no parallelism between the clinical symptoms, the anatomical lesions and the invasive and pathogenic behavior of the micro-organisms. The biochemical activity of the twelve types proved to be very constant, even over long periods of observation, and it was therefore considered suitable as a basis of classification.

It is now conceived that the various fermentative types are

mutants of one single basic species. Agglutinating sera, prepared with the representatives of the different fermentative classes, showed no uniformity in serologic behavior within the same class. The representatives of a fermentative group belong to different serological groups, while strains of different biochemical qualities were serologically identical. The same results were obtained with complement-fixation tests. The findings of Christiansen and those of previous investigators leave no doubt that a classification based on the immunologic properties of the pathogenic strains is impossible.

To compare the pathogenic strains with normal intestinal strains of *B. coli*, Christiansen isolated additional cultures from twenty-five healthy calves from twenty hours to nine days old. These animals were carefully chosen from herds in which for a long time no case of white scours had been observed. In the small and especially in the large intestines of the normal calves, a great variety of *B. coli*, both in number and type, was found. From these twenty-five young calves and seven older animals, Christiansen studied 396 pure cultures. With regard to morphology, motility and growth on the ordinary media, the same relationship between the different strains and their fermentative behavior could be established as was the case with the pathogenic strains. In several animals only one type was found, in others different strains were isolated; from animals belonging to the same herd a certain uniformity in the strains was common.

With regard to the behavior against agglutinating sera, the same differences could be detected as among the pathogenic strains; no uniformity was shown within the fermentative groups. It is especially noteworthy that many strains from normal calves proved to be serologically identical with those isolated from cases of colibacillosis.

Producing An Immune Serum

Of primary importance are the experiments which deal with the production of an immune serum capable of protecting calves against infections with the different types of *B. coli*. The first investigations were carried out by Jensen with pathogenic strains. He was able to immunize a horse easily, the serum of which protected guinea pigs against the strain used for immunization as well as several other strains.

Joest stated that an immune serum produced in rabbits was

unable to protect against strains other than the homologous. Christiansen immunized rabbits with white scours organisms and with normal strains, and he found differences in the behavior of the representatives of each group. White scours sera were able to protect white mice against certain normal strains, while, on the other hand, sera produced by normal strains are, in some instances, capable of preventing an infection with typical white scours organisms. A monovalent serum, as a rule, was able to protect against the homologous strain and several others, but by no means against all. For instance, an infection due to a given strain could be neutralized by the homologous serum. In a series of seventeen heterologous serums, only five showed a marked protective power toward this particular strain. Serums produced by pathogenic strains, as well as those obtained with cultures of normal animals, may be able to protect against infections of both types.

In conclusion, it may be stated that neither the biochemical nor the serologic behavior nor the protection tests with immune serums is capable of distinguishing the numerous *B. coli* strains isolated from the intestines of normal calves or the tissues of true cases of colibacillosis.

A closely related germ to *B. coli*, isolated by Jensen in a few outbreaks of white scours, is *B. aerogenes*, first described by Escherich. This micro-organism occurs also in the normal intestinal flora, and like *B. coli* seems to comprise quite a number of types. Under certain conditions this bacterium becomes virulent, the clinical aspect and the post-mortem examination correspond closely to those of colibacillosis.

Other Organisms Involved

Among the other micro-organisms occasionally producing the picture of white scours, aside from *B. paracoli*, which I would like to discuss separately, the most important are a gram-positive diplococcus and *B. proteus;* while *B. metacoli* (Jensen), *B. abortus* and *B. pyocyaneus* have been isolated only in sporadic cases.

A diplococcus has been found as the causative agent in 9 cases out of 73, by Krautstrunk, and in 16 he recorded the presence of both micrococci and *B. coli*. Clinically and pathologically, this infection is very similar to colibacillosis; the spleen, as a rule, is markedly swollen, and not infrequently hemorrhages are observed in the spleen capsule and in the epi- and endocardium. The diplococcus is apparently related

to *Diplococcus lanceolatus*, one of the causative agents of human pneumonia (Jensen). In Switzerland, this infection occurs not infrequently in older calves, and is often mistaken by practitioners as anthrax.

B. proteus has been found by Jensen to be a causative factor in several outbreaks of white scours, but only in calves of at least several days, or even a week old. The course of the infection on an average is slower, the feces are never bloody and the spleen is not swollen; the intestines appear greatly distended by gas, the intestinal mucosa pale and the liver and kidneys degenerated.

It is doubtful, however, if in those cases in which a bacteremia is absent, *B. proteus* is the true cause of intestinal disorders. Recent investigations of intestinal intoxication in children would point to the conception that a large percentage of them are due to an abnormal putrefactive, spore-bearing, anaerobic flora, which under similar conditions may be responsible for troubles in young animals. Investigations along this line have not yet been carried out and are very desirable.

The Paracolon Bacillus

The *B. paracoli*, as it was designated by Jensen, has been isolated from several outbreaks of white scours. This microorganism takes a peculiar position. It is not, like the other causative germs of white scours, a more or less regular inhabitant of the intestines; quite a number of the investigators failed to find it among the intestinal flora of healthy individuals, both calves and adult cattle. *B. paracoli* (Jensen) is identical with the group of paratyphoid B. which includes *B. enteritidis* (Gärtner) and *B. paratyphosus* (Schottmüller). The infection occurs in the great majority of cases not in new-born but in calves of at least five to eight days old, most frequently in the third or fourth week. Christiansen, for instance, autopsied 222 cases of paracolibacillosis, and he reported the ages as follows:

16 below 8 days
57 between 8 and 14 days
84 between 2 and 4 weeks
61 between 1 and 6 months
4 above 6 months.

Paratyphoid in calves has been recognized as an independent contagious disease for the first time in 1897, by Thomassen, in Holland. He described it as a septicemia with nephritis and

urocystitis in animals of from five to eight days, or less frequently from four to five weeks old. The *B. septicus vitulorum* (Thomassen) is identical with *B. pseudo-coli* (Poels). Aside from these reports and those published by Jensen and Christiansen, in Denmark, the presence of this disease has been ascertained by Wiemann, in Germany, in the United States by Buckley and Mohler, in adult cattle, and by Meyer, Traum and Roadhouse, in certain forms of infectious diarrhea in calves. Recently a monograph on this paratyphoid enteritis has been published by Karsten, in Germany. Most of the so-called paratyphoid strains belong to the group of *B. enteritidis* (Gärtner), but a few

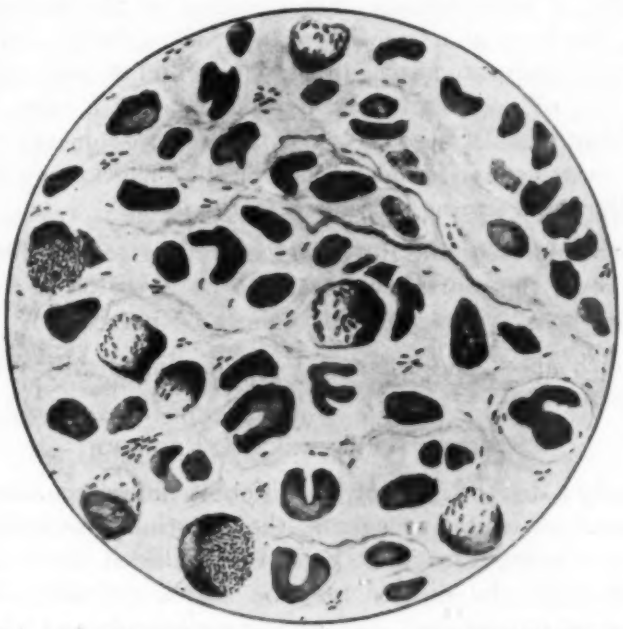

FIG. 1.—Cortical renal focus smear, showing phagocytes enclosing bacilli.

are identical with paratyphoid (Scottmüller). Titze and Weichel, for instance, found among 210 cultures isolated from different outbreaks of white scours, two strains identical with *B. paratyphosus*, 24 with *B. enteritidis* (Gärtner), while 4 were designated by the authors as *B. paracoli* (not influenced by either paratyphoid or *B. enteritidis* serum).

SYMPTOMS OF PARATYPHOID IN CALVES

The clinical aspect varies greatly, often a sudden onset, with high temperature up to 41° C. 106° (F.) and more, and a marked weakness are noted; pulse and respiration are rapid and the

appetite is lowered. At the beginning, constipation, and afterwards diarrhea are observed; now and then cases may be complicated by pneumonia and swellings of the joints are not infrequent. The duration of the disease varies from eight to fourteen days, but may last four weeks, as evidenced by the tenderness and swelling of the joints. The post-mortem examination reveals less marked alterations in the digestive canal than in colibacillosis; there is rarely a hemorrhagic inflammatory process of the small intestines. In a few instances, a sero-fibrinous enteritis has been described, and the spleen on an average is markedly swollen. Jensen found in young calves frequently a sero-fibrinous inflammation of the serous membranes, the liver as a rule is swollen; 30 to 50 per cent show red, slightly indurated areas in the lungs, and 20 per cent small, yellow foci of necrosis in the liver, which, as a rule, are not bigger than a millet seed. Similar, but macroscopically scarcely visible, necroses are found in the spleen. The kidney necroses are of the same size as those seen in the liver.

The morbidity of the disease is, according to Karsten, 45 to 90 per cent; the mortality is said to be 25 to 30 per cent, in severe outbreaks it may be as high as 60 per cent.

So much about the different bacteria etiologically related to white scours.

Specific Treatment a Problem

According to the variety of different microorganisms that may occur as causative agents, the question of specific treatment in a given case may be a very difficult one. Animals suffering from the disease may be saved, provided that one happens to possess just the proper antiserum and that it is administered in a large dose intravenously. The prophylactic treatment, however, has more chance to be successful, provided, again, that the sera correspond to the germs responsible for the disease. It has been shown that a highly potent antiserum against *B. coli* and *B. paracoli* can be produced. Provided a potent polyvalent serum containing antibodies against the different types of *B. coli* and *B. paracoli* is used, the preventive injection may in the majority of cases confer a sufficient protection. Toward the infection with *B. aerogenes*, Jensen succeeded in obtaining a potent antiserum. In large, pure-bred herds, in which the disease is endemic, it may be advisable to

use a special serum manufactured with strains isolated from fatal cases of the herds.

Bacteriological Diagnosis Essential

In all cases of enzootic character, one should not fail at least to obtain a careful bacteriological diagnosis, which may enable the veterinarian to use an adequate prophylactic serum; perhaps in no other disease is it so highly desirable to know the true cause, if one remembers that neither the clinical aspect nor the autopsy is typical for any of the causes. Accorrding to Jensen, the results of serum treatment in cases showing no bacteremia have been doubtful. For the treatment of these cases, he recommends the use of colloidal silver *per os*; kaolin and charcoal nowadays would be more advisable. In the case of an infection with diplococci (as far as the published reports permit us to conclude), it seems that serum treatment has not been tried. In the paratyphoid fever of older calves, prophylactic serum treatment is, according to Christiansen, very efficient.

The passive immunization against white scours a few hours after parturition is the only specific prophylactic treatment, and will, as a rule, protect the animals during the period of greatest susceptibility. Treatment by vaccines and bacterins is useless; they may be used in combination with serum treatment to enforce and to prolong the passive immunity, inasmuch as the latter lasts for about a fortnight.

Antibodies Transmitted by Colostrum

The mode of action of the serum is not definitely known; it stimulates phagocytosis, and presumably it possesses bacteriolytic power. The dose for curative purposes should not be less than 30 cc; as a preventive dose, usually 15 cc are administered. For the sake of completeness, attempts may be mentioned to confer immunity on young calves by immunizing the pregnant cows. Several investigators expected the antibodies to pass in the blood stream from mother to fetus. Recent studies have shown that this presumption is erroneous; a transmission takes place only by the colostrum. Moreover, it is very doubtful if the value of such an immunization counterbalances the risks of the procedure.

Changes in the Intestinal Flora

In this connection, it seems advisable to draw attention to another possibility of treating intestinal disorders, namely a therapy originally advocated by Metchnikoff. The intestinal

flora of both man and animals changes very materially during evolution, and it has been found that the alimentary environment is a very important factor in determining the character and the numbers of bacteria present and the metabolic products formed by them. For instance, a diet rich in carbohydrates is favorable to the growth of the anaerobic *B. bifidus,* a normal inhabitant of the young child's intestine; while as the child grows and the nutritional conditions change with an increase in the proportion of protein to carbohydrates, *B. bifidus* begins to disappear and other bacteria, especially *B. coli,* take its place; this latter germ being more versatile than *B. bifidus,* it produces indol particularly in an environment rich in protein, whereas acids are formed in carbohydrate media. These conditions in bacterial metabolism have been cleared up through the work of Kendall, Torrey and others.

There are two different ways to influence unfavorable bacterial activity in the intestinal tract; first, the growth of undesirable micro-organisms is prevented by adequate dietary measures; secondly, bacteria with favorable activities upon the host may be introduced into the intestines. The administration of diets rich in lactose has proved to be advantageous in infections with dysentery and typhoid bacilli. Changes in the intestinal flora by implantation of a suitable germ, as, for example, *B. bifidus* and *B. acidophilus* in connection with an adequate diet, have been successful. In very young animals, it is possible to replace entirely the normal intestinal flora with *B. acidophilus,* and if lactose is given simultaneously, the overgrowth of undesirable inhabitants of the intestinal tract is checked.

According to Torrey and Kahn, the growth of several proteolytic, spore-bearing anaerobes, such as *B. sporogenes, B. histolyticus* and *B. botulinus,* can be inhibited. Investigations of Morris, Porter and Meyer show that in certain intestinal disorders of children a strongly putrefactive flora is observed, and may disappear if a strict carbohydrate diet is administered. According to Rettger and his associates, good results in human beings have been obtained by the ingestion of acidophilus milk, which is a pure culture of this bacillus in milk. This procedure has been adopted extensively in human medicine, and attempts along this line in young bovines are most desirable.

Predisposing Factors Important

It is a well-known fact in immunology that the presence of pathogenic germs in a susceptible organism does not always

result in infection and disease. As a rule, predisposing factors, lowering of resistance, must interfere to establish the infection. This is especially true with germs, which, like those responsible for white scours, are usually harmless and have no invasive power. We have already seen that except in pathogenicity, there is no difference between the strains of *B. coli* commonly found in the intestines of normal individuals and those isolated from cases of colibacillosis.

Jensen early admitted that under certain conditions these intestinal strains may become pathogenic. He succeeded in producing the typical symptoms of white scours in new-born calves by feeding small amounts of creolin, pyoktanin and trichlorid of iodin in the milk. The blood and the organs of the animals which succumbed showed *B. coli* abundantly and in pure culture, and especially interesting is the fact that those germs cultured from the organs were virulent for calves and could by no means be distinguished from those isolated from spontaneous colibacillosis. Furthermore, Jensen and also Poels stated that new-born calves, during the first twenty-four hours of their lives did not tolerate boiled milk, that the ingestion of it caused an acute fatal hemorrhagic diarrhea. At the autopsy, these animals showed the same lesions as those dead from spontaneous white scours, and the bacteriological examination gave the same identical results in both.

These facts point to the conception that the intestinal tract is the portal of entry, and that the infection takes place from the proximity of the cow immediately after parturition, the causative germ being ubiquitous. General hygienic measures, cleaning and disinfection of the mother and her neighborhood, disinfection of the umbilical cord, muzzling of the new-born calf and isolation immediately after birth are advisable, but in spite of all those attempts to keep invading germs away, cases of infection may occur. The statements of Jensen explain furthermore why colibacillosis may appear in herds where cases have never before been observed and where there is no evidence of introduction from without.

Additional and very important contributions to the understanding of predispositional causes in white scours have quite recently been furnished by Th. Smith and his co-workers. Basing his work on the earlier investigations, especially of Jensen and on studies of Ehrlich on the transmission of ricin- and abrin-immunity to young mice by milk of immune mothers,

Smith drew the attention to the significance of colostrum, and carried out careful experiments in calves on the effect of withholding this first secretion. The question had been taken up partially before by Williams, studying the problem of feeding new-born calves and emphasizing the importance of colostrum as a carrier of antibodies, and by Traum, in the special case of calf-raising in tuberculous herds.

Theobald Smith's Experiments

The experiments of Smith are conclusive. In a given herd, he chose two groups of new-born calves, the first was fed colostrum, the second received none. From the first group, comprising ten animals, all survived the time of danger; three of them, however, died but only after 25, 38 and 45 days, respectively, from an unknown cause. From the second group of twelve calves, to which no colostrum was fed, nine died, seven of them within six days, and only three survived. The autopsies of the different animals showed a varying picture, which was the same as that usually observed in spontaneous white scours; the bacteriological investigation furnished the evidence of the same definite condition in all animals which succumbed: the blood, as well as the spleen, liver and kidneys, contained large numbers of *B. coli*, mostly in pure culture.

The Function of Colostrum

These experiments prove, first, the presumption of Jensen, that in a general way, under certain conditions, harmless microorganisms are able to become virulent; and, second, they demonstrate that calves kept under the same sanitary and environmental conditions, but deprived of colostrum may be attacked by white scours. The function of colostrum, therefore, is essentially a protective one against the various bacteria which, so long as the new-born body is still lacking proper defensive powers, invade it and multiply in the various organs.

According to further experiments, it seems possible to replace colostrum by feeding cow serum. In this connection, it is interesting to mention the statements of Smith and his co-workers that the blood of new-born calves from abortion-immune cows does not contain agglutinins, while, as soon as those calves receive colostrum, agglutinins will appear in the blood in a relatively short time.

It has furthermore been shown, especially by Howe, that the agglutinins are intimately related with a certain globulin-fraction, euglobulin; it was possible to remove the agglutinins from the serum and the colostrum by precipitation of these globulins, which apparently are able to pass the intestinal wall of the new-born in an unchanged form. The globulin content of colostrum is much higher than that of milk of cows well along in lactation; the fact, however, that the blood of the new-born does not contain euglobulin and that they acquire it from the colostrum has been confirmed also for human beings by Lewis and Wells.

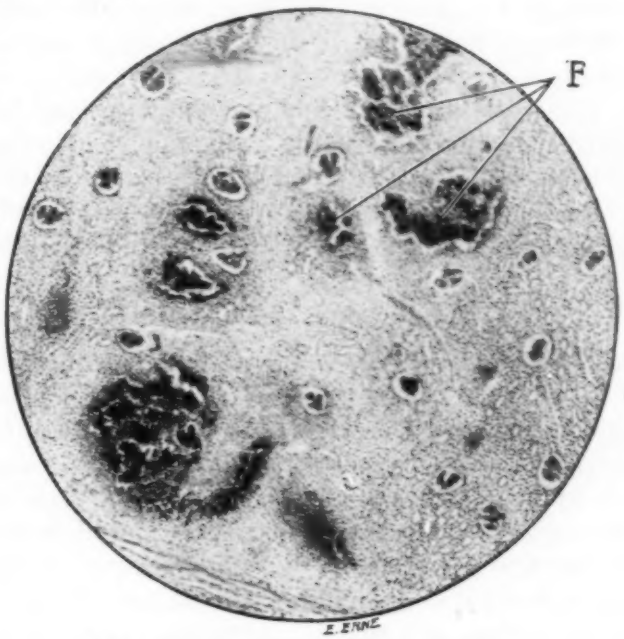

FIG. 2.—White spotted kidney. F, cortical foci.
(Small enlargement)

WITHHOLDING COLOSTRUM ATTENDED BY DANGER

These interesting statements have shown that withholding of colostrum is an important predispositional factor in white scours, but it is not the only one, because we may observe the disease in herds where colostrum is not withheld; in those cases, bad hygienic conditions, individual weakness or noxious intestinal microbic activity may pave the way to invasive bacteria.

The first publication of Th. Smith mentions pathological alterations in cases of experimental colibacillosis produced by

withholding of colostrum. To these findings, I should now like to draw your attention. One of the calves, killed when 27 days old, presented numerous whitish sclerotic spots in the kidneys, which the author admits are due to *B. coli* or some organism associated with it.

White Spotted Kidneys

These lesions, described by Smith, are no doubt identical with those not infrequently found (at least in Europe) in the slaughter-houses, in apparently healthy calves. This pathological condition is known by the designation, white spotted kidneys. It is characterized by well-marked white or yellowish spots of the size from a millet seed to that of a hazelnut, frequently projecting over the surface of the organ. Their consistency is that of connective tissue; sometimes these spots are fused, and in certain instances very little of the normal renal tissue may be left. These lesions have always incited the attention of investigators, and much work has been done to clear up the origin of the condition. Histologically, the alterations are well studied, and especially Kitt, Sakaguchi and Nieberle have furnished accurate descriptions.

True Character Recognized

In regard to the origin, very different views have been issued. Vaerst and Guillebeau believe that the spots are foci of blastemas persisting from embryonic life. Ostertag originally held them to be innate blastemas of sarcomatous and fibrous character. Petrovitch considered them to be the result of a toxic inflammation caused by the feeding of excessive quantities of milk. Rieck was the first to recognize the true character of the condition, and analysed it as a serofibrinous nephritis. He presumed the alteration to pass, as a rule, in restitution, taking place with formation of connective tissue; as port of entrance for the causative agent, he admitted the intestines. Kitt also interpreted the process as the result of an inflammation with exuberant growth of fibroplastic tissue and round-cell infiltration. He called it nephritis fibroplastica indurativa. According to Kitt, the causative agents must be non-pus-forming micro-organisms. In a few instances, bacteria, such as cocci, pasteurella, etc., were found by different authors.

The reason why most of the bacteriological investigations gave no result is apparently to be found in the inadequate material used, the earlier stages of the condition having been

overlooked. In 1922, in collaboration with Dr. Krupski, we had an opportunity to secure a sufficient number of cases which we considered fit to furnish information regarding the possible origin of the spots in question. Forty-eight pairs of kidneys were collected, but only twenty-nine were studied bacteriologically and histologically. These organs presented, as a rule, the following picture: the lesions in both organs of each case were about the same, although not always reaching the same degree.

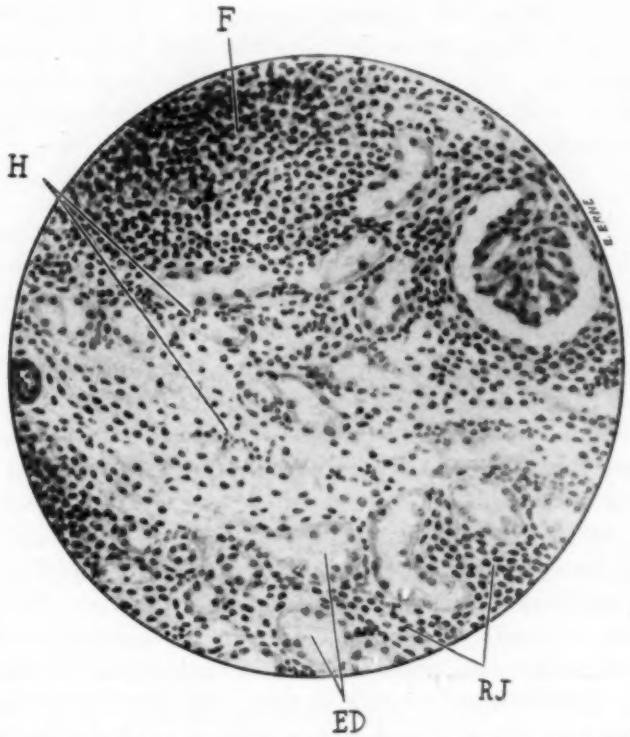

FIG. 3—Interstitial infiltration with round cells (RJ); formation of foci (F) and partial epithelial desquamation in tubuli (ED); hemorrhagics (H).

The kidneys in a few instances were enlarged, showing approximately double the size of the normal; on the surface there were subcapsular, yellowish areas of about the size of a millet seed. In some instances only a few of these foci were found in single renculi; in other cases they were spread over the whole surface of the organs; often these foci showed a well-marked hemorrhagic border; on cross-section they appeared confined exclusively to the cortex; not infrequently entirely hemorrhagic

renculi were seen. Prominent were those cases, where these fresh areas were found and even on the same renculus, together with the typical white spots of the size from a millet seed to that of a pea.

In other instances, we found entirely white renculi and others showing only a few, small, hemorrhagic areas. In some cases, small white foci were melted together, and often we could find slight insignificant hemorrhages. Finally, we found a few cases in which one kidney showed fresh foci, while the other, slightly hyperemic, presented nothing particular. It is to be noted further that often the renal hilus, as well as the surrounding fat tissue, the capsules and the subcapsular connective tissue showed a well-marked edema and the lymph-glands of the hilus were mostly enlarged.

Histological Findings

The histological findings of these lesions prove the transformation of the initially inflammatory areas into the typical white spots. The microscopic section shows these foci as accumulations of lymphocytes located in the zone of the glomeruli, or as wedge-shaped infiltrations following the tubuli recti throughout the cortex, large areas of these tubuli often being destroyed by confluent neighboring processes; these infiltrations consist of lymphocytes, a few polymorphonuclear leucocytes, a varying number of fibroplasts and erythrocytes. Often a desquamation of the epithelium in the tubuli is observed, the lumen containing hyalin cylinders; in rare instances there is a proliferation of blood capillaries and slight hemorrhages. As a rule, the glomeruli are not touched. Other foci, often in the immediate neighborhood of fresh ones, show a marked proliferation of connective tissue; their formerly inflammatory character is betrayed by a varying number of lymphocytes in their center. The proliferation of fibroplasts is especially obvious between the tubuli, the process being chiefly an interstitial one.

To sum up: these alterations show the picture of an interstitial, embolic, focal nephritis with a well-marked tendency to cicatrization, a transformation which apparently takes place fairly rapidly.

The results of the bacteriological examinations are as follows: In most of the cases the smear from fresh foci showed the evidence of an infection; in varying numbers there were found stumpy, bipolar-staining, short rods, not taking the gram stain, and it

is particularly important that very often and in great numbers these rods were included in polymorphonuclear leucocytes. In one of the 29 cases a micrococcus was isolated; the other 28 cases furnished pure cultures of the rods. The further cultural and serological investigations showed that all but one of these 28 strains must be designated as *B. coli*; the remaining one, on account of its atypical serological behavior, was diagnosed as

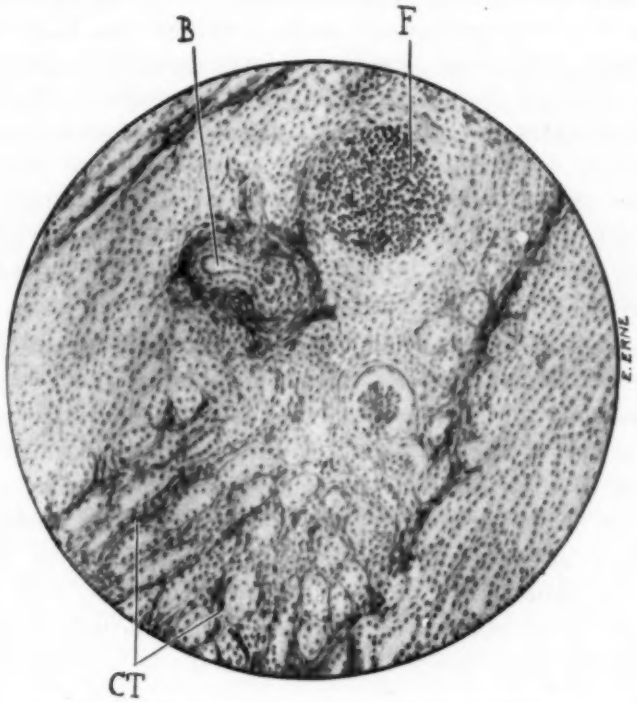

FIG. 4—Interstitial proliferation of connective tissue and round-cell infiltration (CT); focus of round cells, with hyaline border (F); blood vessel, with proliferation of connective tissue at the periphery (B).

B. paracoli. It may be worth while to mention that the 27 colon strains were readily agglutinated by a specific, white-scour-colon, agglutinating serum.

COLON BACILLUS RESPONSIBLE

From these results, which in a sense complete those of Th. Smith, we may conclude that particularly *B. coli* is responsible for the lesions in the white-spotted kidneys; the histological findings, especially the appearance of freshly infected areas, together with regenerative processes in the same organ show that the infection must have taken place not at once but con-

secutively during a longer period, as is the case in bacteremic infections. In a number of cases a marked agglutinative power of the calves' sera toward the corresponding kidney strains has been noted.

It is well known that certain experimental infections of small animals have a tendency to localize in the kidneys. This is especially true for cocci and streptococci. Rosenow and Meisser claim this localization of streptococci to be an elective one. A great deal of experimental work in rabbits has been done in connection with colon infections of the urinary tract of man. Bailey obtained formation of amyloid deposits in the spleen, liver and kidneys, golmerulitis, degeneration and interstitial infiltration, with round cells and proliferation of connective tissue by repeated intravenous injections of living colon bacilli in rabbits over long periods. Major mentions one rabbit intravenously injected with large amounts of *B. coli*, which showed scarrings of the kidney cortex.

Lesions apparently somewhat different have been observed by Helmholz and Beeler. These authors injected 66 rabbits intravenously with *B. coli*, isolated from pyelocystitis cases in man, and in 11 of the animals they observed lesions in the kidneys, besides those in the cecum, the gall-bladder and the appendix. The kidney lesions are described as cortical and medullary abscesses and pyelitis. In another series, they injected 31 rabbits, 17 of which showed pyelitis, and in nine instances there were cortical abscesses in addition; they admit a specificity with which this organism tends to localize in the kidney.

It is particularly interesting that Helmholz and Beeler mention in their first paper that in ten of the cases they found rabbits with spontaneous kidney lesions. Some, showing chronic alterations, presented also acute processes from which colon bacilli were isolated; the authors admit that there was a double process in the four animals; the chronic processes were manifested by focal increase in connective tissue and the formation of lymphocytic infiltration. In some cases the infiltrations left very little of the kidney substance; in others, a more diffuse increase in connective tissue between the tubules was noted. No doubt both the chronic and the acute lesions were, contrary to the presumption of the authors, of the same origin, the causative agent being *B. coli*.

Similar Lesions in Rabbits

Similar chronic alterations of spontaneous nature in rabbit kidneys have been described by Bloomfield, and the histological picture is accurately the same as that observed by us in the spotted kidneys of calves. It seems very likely, therefore, that there exists a pathological condition in rabbits which may appear spontaneously, and that this same process, very similar to white-spotted kidneys of calves, can be produced by intravenous injections of *B. coli*.

We, therefore, do not hesitate to claim the origin of the white-spotted kidneys in calves to be the end and restitution stage of a general infection due mostly to *B. coli* and similar micro-organisms, these infections being conceived under the general expression of white scours.

To make this relation evident, we searched for further cases in which we would be able to demonstrate the simultaneous occurrence of an enteritis and spotted kidneys. We succeeded in showing this evidence in four out of fourteen cases in which *B. coli*, isolated from the early stages of the spotted kidneys, seemed to be identical with that obtained from the intestines and the intestinal lymph-glands. These investigations, however, are not completed. We hope to have an opportunity to prove the relation just outlined by an additional number of cases. Our statements concerning the occurrence of *B. coli* in spotted kidneys are confirmed by a publication of Christiansen, unknown to us at the time this work was in progress. This author established the presence of *B. coli* in 15 out of 16 cases; in one of them he found an organism which he designates as *B. metacoli*; some of the isolated strains proved to be identical with types found in the common colibacillosis.

In summarizing the various facts just presented, I desire to state that our present conception on the origin, the causative agents, the predispositional factors and the possible consequences of white scours is fairly complete, although many points, particularly the mode of prevention, remain to be cleared up in a more thorough way. Future studies should consider the anaerobic flora of the intestinal tract of calves. Finally, I should like to recall that our present knowledge concerning the conditions favoring the occurrence of the disease is due mostly to American investigators, and I wish to express my high appreciation of American research work and American science.

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DR. HARING TO TOUR EUROPE

Dr. C. M. Haring, Professor of Veterinary Science, University of California, and Acting Director, California Agricultural Experiment Station, has been granted a year's leave of absence by the University. Accompanied by Mrs. Haring, he will spend the year traveling and studying in Europe. President Stange has appointed Dr. Haring as the duly accredited representative of the American Veterinary Medical Association at the Second World's Poultry Congress, to be held at Barcelona-Madrid, this month.

A STUDY OF HART'S ARTICLE ENTITLED "CONTROLLED VACCINATION EXPERIMENTS ON CATTLE WITH BACTERIUM ABORTUM"[4]

By W. L. WILLIAMS, *Ithaca, N. Y.*

In his initial paragraph (p. 37), Hart says, "The possible value of live abortion germ vaccine in the control of bovine infectious abortion has been recognized since the early work of Bang[1] published in 1897. This investigator obtained definite protective results in experiments on sheep, goats and cattle. Later, it was studied extensively and used in the field by MacFadyean and Stockman,[2,3] of the British Ministry of Agriculture."

Bang,[1] in concluding the article cited by Hart, says, "Inasmuch as epizootic abortion belongs to that group of diseases which as a rule are followed by at least a relative immunity, the possibility should be considered of producing a prophylactic immunity by the injection of a vaccine or abortion serum. The answer to this question and the development of such therapy must be left to the future. *Perhaps there is nothing to be accomplished in this field.* Fortunately, it is practicable, through the painstaking application of the old reliable means of isolation and disinfection, to control the malady in a satisfactory manner."

The article of Professor Bang, cited by Hart, is limited to a discussion of the cause of abortion, and does not include vaccination except as quoted above. Bang[12] later recorded some inconclusive experiments, but, so far as I can find, has at no time advocated vaccination as a valuable control measure. In the final paragraph of his latter article, Bang says, "I am far from pretending that I have solved the question of vaccination against abortion."

The first contribution of MacFadyean and Stockman[2] cited by Hart is devoted entirely to a study of the abortion in sheep associated with a vibrio, and, so far as I can find after a careful reading, does not mention vaccination of cattle with the Bang bacillus.

In his second citation of MacFadyean and Stockman,[3] the only discussion of vaccination which I am able to find is on page 38, where they record the vaccination of 8 ewes (63-70) with one

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control (105a). Later, all were bred and artificially infected. The 8 vaccinates produced 2 lambs (25%) and the control a weak lamb (100%) which soon died. They vaccinated two heifers, which later conceived and were killed pregnant, one 94, the other 130 days before the expiration of the normal duration of gestation, without any reliable information of the fate of the pregnancies had they been allowed to continue.

The reader would be inevitably led to infer from Hart's statement that MacFadyean and Stockman had obtained distinctly favorable results from vaccination, but the records, so far as I can find, do not so indicate.

Later, the views of MacFadyean and Stockman apparently diverged. MacFadyean[13] preferred isolation, and regarded vaccination as a dangerous method of perpetuating the infection.

Stockman[8] advocated vaccination in 1914 when he reports: "Over 3000 inoculations have been carried out." He then records very imperfectly 1020 of the vaccinations, or about one-third. There were sterile, died or sold, 130 (12.7%); aborted, 52 (5.1%); or a total of 17.8% of failures to produce calves. He fails to define *abortion*, does not state how long upon the average was required for each cow to produce a calf, and fails to indicate how many of the cows, which under his nomenclature "calved normally," expelled dead fetuses or died from metritis. After an interval of nine years the data upon the other two-thirds of the vaccinates have not been published, so far as I can find.

The Silent Majority

Hart cites Hadley[9] as having obtained definitely favorable results from vaccination. Hadley reveals, but Hart fails to note, that he had distributed "nearly 1000 doses," and reports the results upon 474, or 47.4%. I know what happened to some of the omitted 52.6%, having attended a group of valuable heifers upon which Hadley's vaccines had been used. Most of them went to the butcher on account of incurable sterility. As the years roll by, since Hadley reported upon a minority of his vaccinates, the silence regarding the fate of the majority deepens. It is the silent majority in reports like those of Stockman and Hadley which holds the chief interest for the practitioner and breeder.

Hart and others have a perfect right to draw any conclusions they like from any data. In the confusing subject under dis-

cussion the conclusions should be accompanied by all pertinent data. The literature of Bang[1] and of MacFadyean and Stockman,[2,3] cited by Hart, is not conveniently available to one in five hundred American veterinary practitioners, and the citations made inevitably mislead anyone not conversant with the facts.

It should be obvious also to anyone familiar with human nature that it is highly perilous to rely upon fragmentary reports like those of Stockman[8] and Hadley,[9] based upon a wide-flung distribution of vaccines to Tom, Dick and Harry. In such experiments the owners best pleased with the consequences will be the most certain to report. Where the results have been bad, the owner feels like the purchaser of a gold brick and keeps still.

Work of Schroeder Overlooked

There are other published data upon vaccination, regarding which Hart is ominously silent, though the facts are perfectly well known to him. For example, he passes over in silence the data of Schroeder[14] with 928 vaccinations in a valuable pure-bred herd with such results that the owner discontinued the treatment within two years, although the United States Department of Agriculture was doing the work free of cost by its most expert abortion vaccinators. These data of Schroeder constitute the most illuminating statistics thus far published, so far as I know, but they are not being quoted by the manufacturers of abortion vaccines or vaccination enthusiasts.

The data of Hart are extremely confusing and often incomprehensible. The 45 females were drawn from 6 separate sources (p. 39), but with minor exceptions individuals cannot be identified. Instead of numbering them from 1-45 serially, they are numbered chaotically from 4-A to 2317. In his agglutination tests one cannot learn if by *positive* he means 1-10 or 1-500. The ages of the animals are not stated. The bull used and breeding dates are recorded for only a fraction of the animals. Confusing errors abound. On page 43 he says, "The bulls were taken from Group II and started to breed the animals in Groups I and II." On page 53 he states that, "on February 5, 1922, bull 411-A was in poor condition." Bull 412 took his place, and "one week later, bull 412 jumped the fence . . . and bred cow 20-A, an infected control in Group II which had aborted on September 10, 1922. In jumping the fence, perhaps "in

reverse," he had jumped backward chronologically almost six months. Everywhere such errors crop out in a manner to indicate that they are not chargeable to the printer's devil. On page 49 he says, "All of the seventeen animals in this group that became pregnant carried their calves to term except 407-A." He fails at that point to indicate how many of the 17 became pregnant, and the reader must look elsewhere to find out. These errors are exceedingly confusing and require infinite study, with uncertainty in the end.

Untoward Effects of Vaccination

The immediate results of the vaccination, as recorded on page 42, are passed over with remarkable ease. All vaccinates were too ill to eat for four or five days. After a lapse of 31 days 40% had inoculation abscesses, another 40% had inflamed and swollen lymph-glands and all were in poorer condition than the unvaccinated controls. He admits that "the animals of this (the vaccinated) group, although they had apparently entirely recovered from the effect of the vaccination, came in heat slowly." Although the normal estrual period is 19 to 22 days, Hart admits on p. 44 that "On May 12, 1922, on account of the animals breeding slowly, seventeen only having been bred," etc., was holding up his work. This indicates that of the 30 animals vaccinated on Feb. 7 (p. 41), 13 (43.3%) were still suffering from the vaccination on May 12, a period of 94 days, to such a degree that they were not in physical condition to function sexually. The delay had totalled for the 13 animals 1222 days, equivalent to 3.34 years for one animal, to say nothing of important delay on the seventeen then pregnant.

It would be an insult to the intelligence of a breeder for a practitioner to advise vaccination against abortion when such losses are to follow. Clinicians know that breeders will not tolerate such work in their herds. Barker[5] records a similar wreck following vaccination, although not nearly so severe, but it sufficed to cause the owner to interdict promptly the further use of vaccines and to change veterinarians.

On page 44 it is recorded that 2318 was erroneously injected with live bacteria when pregnant. Later she was in estrum, her uterus was empty and she copulated. Hart says, "An effort was made to demonstrate *Bacterium abortum* by microscopic examination, . . . the organism could not be demon-

strated. . . . Two guinea pigs were injected . . . both were found normal when killed. . . . We therefore feel that abortion in this case was due to the vaccination."

On page 46 Hart relates that 428-A was bred on April 27, and examined and pregnancy diagnosed 58 days later, on June 24. On August 5, 42 days later and 100 days after breeding, she was in estrum. Hart therefore repudiated his diagnosis of pregnancy.

The two cases were identical in all essential respects, so far as I can find in the record. Pregnancy had been diagnosed, the expulsion of a fetal cadaver was not observed, the animal was later in estrum, her uterus was empty, abortion bacilli were not recovered from the genital tract, and even an agglutination test is not recorded. The adherence of Hart to his diagnosis in 2318 supports his belief in the power of Bang's bacillus to cause abortion. The repudiation of his diagnosis of pregnancy in 428-A supports his belief in the value of abortion vaccination.

California Bulletin 353

Turning to California bulletin No. 353,[7] Hart records that at the time when the experiments now under discussion began, there prevailed in the University dairy herd a rate of 12.5% of abortions, with an additional 7.5% of retained fetal membranes, totalling 20% of pathological terminations of pregnancy. The Bang germ could not be demonstrated in any one of the cases, in spite of very careful search. The phenomena were not separable clinically or by autopsy of the aborts from bovine infectious abortion. Hart[4] admits (p. 52) that a pregnant cow may carry an abundance of abortion bacilli in her uterus, go to full term and calve, to all appearances physiologically. Thus Hart holds[7] that cows may abort abundantly in the absence of the Bang bacillus or other recognizable cause, and that they may have abortion germs galore in the uterus and be none the worse for it.

On page 30 of the article under consideration[4] it is found that in assembling his 45 females Hart took 15 direct from the dairy herd, where a rate of 20% of pathological terminations of pregnancy prevailed. Another 5 of his animals had been on the premises for several years according to his statement. The other 25 animals were drawn from four neighboring herds, where there probably existed a similar rate of abortion and other results of genital infections similar to that pre-

vailing in the University dairy. At any rate the newly introduced animals were at once exposed by association to the unrecognizable infection causing serious losses at the time.

Hart suggests no reason for assuming that his experiment animals would, if let alone, suffer less from these inscrutable infections, especially when burdened with the increased strain of experimental conditions. It is an important rule of infections that whenever the vigor of the patient becomes depressed by improper food, defective care, or the advent of serious infections of another type or species, the resident infection takes on a new virulence. When, therefore, Hart depressed the vigor of his vaccinates in so tremendous a manner as he has recorded, increased virulence of the infection already in his experiment animals should logically be greatly intensified. It is not essential that the newly introduced infection has an affinity for the genital tract, though that might well render the consequences additionally serious. It cannot conceivably be supposed that the injection of living abortion bacilli at any time or in any amount would prevent a female from aborting or having retained placenta due to the already existing inscrutable infection which Hart[7] has so admirably described, except that when used upon the non-pregnant animal it would constantly tend to advance the infection to such a degree as to induce sterility.

Gave Birth to a Dead Calf

Hart[4] (p. 40) says, "All the seventeen animals in this group that became pregnant carried their calves to term except 407-A, which was accidentally killed." A careful study of pages 45-46 makes it appear that all the 17 pregnant animals of this group, except 407-A, which died from accident, that is, 16 females, carried their calves to term. He fails to define "term" or to state directly the duration of pregnancy in any case. Most readers would erroneously assume that the 16 vaccinates calved physiologically. A careful reading shows that 418-A (p. 50) gave birth to a mortally ill calf, which quickly perished. The table on p. 46 shows that 418 was bred on May 1, 1922, and on p. 51 that she calved on Feb. 2, 1923—277 days. There was certainly severe intra-uterine infection involving the fetus, though not necessarily the Bang germ. No. 433-A (p. 49) had retained placenta, indicating indisputably a severe placentitis during pregnancy. No. 2305 (p. 49) *"gave birth to a dead calf,"* according to Hart's nomenclature. Actually there was no

birth and no calf was involved. There was simply the expulsion of a fetal cadaver and a retained placenta.

The data upon Hart's Group I of 20 vaccinates may be tabulated thus:

Sterile	3 =	15.0%
Died from accident, pregnant	1 =	5.0%
Calved pathologically	3 =	15.0%
Calved physiologically	13 =	65.0%
	20	100.0%

His 30 vaccinates had, however, been culled (p. 45) in an attempt to get the desired 20 pregnant animals for Group I. He was only partially successful, and got three non-pregnant animals. It appears (p. 45) that his culling occurred on June 24, 1922, and that at that time (p. 46) only one of Group III (413-A) was pregnant. A tabulation of the entire 30 vaccinates shows:

Sterile	9 = 30.0%		
Calved pathologically	3 = 10.0%		
		12 =	40.0%
Accidentally killed		1 =	3.3%
Calved physiologically		17 =	56.7%
		30	100.0%

A tabulation of the 15 unvaccinated controls shows:

Sterile	0		
Calved pathologically (aborted)	6 = 40.0%		
		6 =	40.0%
Calved physiologically		9 =	60.0%
		15	100.0%

These tabulations indicate that the sterility, abortion and pathological calvings taken together are alike in the vaccinates and unvaccinated. However, a cow which has aborted or calved pathologically is far more valuable than one which is sterile, there being a far better outlook for future reproduction.

Unfortunately, Hart fails in his first publication[7] to indicate the degree of sterility in the University dairy. The only available data for comparison between the dairy herd and Hart's experiment herd are the abortions and pathological calvings which, placed side by side, show:

Dairy herd of 40 females			Experiment herd of 45 females		
Aborted	5 =	12.5%	Aborted	6 =	13.3%
Calved pathologically	3 =	7.5%	Calved pathologically	3 =	6.7%
	8	20.0%		9	20.0%

So it appears that the animals selected by Hart continued to abort and calve pathologically during his experiment at the same rate which prevailed in the dairy herd from which he

drew a large part of his animals and with which the others were intimately mixed and thoroughly exposed.

It is universally admitted that Bang's bacillus has a definite affinity for the gravid uterus. It should, therefore, occasion no surprise if after injecting enormous quantities of the live bacillus subcutaneously, Hart should be able later to recover it from the uterus of some of his animals. Especially is this probable when Hart had already recorded[7] that there prevailed in the herd from which he drew his animals an unrecognizable genital infection already causing clinical phenomena and lesions (abortion and retained fetal membranes) not distinguishable from those attributed to Bang's bacillus. In the presence of such lesions the experimentally introduced Bang bacillus obviously had a far greater opportunity to invade the uterus than had that organ been healthy. It is only natural therefore that, while in one case[7] he could detect no cause, in the other[4] he was able to find the introduced "cause" and to change the diagnosis from "Manifestations of Abortion Disease without Demonstrable Etiological Factor" to "Bovine Infectious Abortion." The change in diagnosis induced by the inoculation with Bang's bacillus affected the abortions only. In spite of the presence of Bang's germ, the retained placenta and the "calf born dead" remained as a legacy of the infection already prevalent in the dairy herd when the fifteen experiment animals were taken from it.

The scientific diagnosis of bovine infectious abortion has long been questioned by a small group of students of genital diseases of cattle, but its most bitter and unrelenting critics have never given it such a jolt as has its enthusiastic and devoted friend, Hart, in the two publications cited, when he relies for his diagnosis upon his artificial injection of the germ he wished to blame.

Abortion Not Defined

It is impossible to learn from his paper[4] what Hart means by *abortion*. He does not define it. He describes no case. A study of 2318 (p. 44) indicates that by *abortion* he does not mean that he observed the expulsion of a fetal cadaver or that he had unquestionable evidence that such an event occurred. True, he had diagnosed pregnancy, but under identical conditions (p. 46) he had repudiated his diagnosis of pregnancy in 428-A.

It is made equally clear by studying 2305 (p. 49) that the

observed expulsion of a fetal cadaver does not, in his nomenclature, constitute abortion. He says (p. 48) that six cows aborted, but he does not say that any one of them was seen to expel a dead fetus, does not say that six aborts or even one abort was found, and submits no evidence indicating what actually occurred in any one of the six cows. Since 2305 was able to "give birth to a dead calf," it would appear equally plausible for the six *aborters* each to have expelled a healthy calf. This vagueness is not peculiar to Hart. One group of authors[11] has recently defined abortion as the termination of gestation before the 265th day. Apparently if a cow goes beyond that, she calves "normally," even if the *calf* is a fetus and is "born dead" and the cow dies promptly from retained placenta. It is possible that Hart uses a similar nomenclature.

Abortion Rate Among Heifers High

Hart wishes his readers to understand that his six reported abortions occurred among his fifteen unvaccinated controls as a result of his experimental exposures during pregnancy, thus inducing a rate of 40% of abortions in his controls, as compared with no abortions in his vaccinates. Experienced clinicians know that there are large herds in which the heifers in first pregnancy regularly abort at a rate of 40% or over, and in which adult cows abort at a rate of not over 5% (including "calves born dead"). The veterinarian can with confidence take a group of such heifers and expect 40% to abort if he gently twists their tails, while a group of adult cows from the same herd, or of heifers in first pregnancy from a sexually healthy herd, may be placed upon a luxuriant diet of Bang's bacillus with indifferent loss. Without making it evident to the hasty reader, Hart used two distinct groups as his controls. There was one group of eight females pregnant, apparently, to his experiment bulls. Of this group there aborted, 6 (75%) and calved, 2 (25%). There was a second group of seven females, 183, 430-A, 2317, 2298, 436-A (p. 52), 401-A, and 2060 (p. 41), which were pregnant by other than the experiment bulls, of which there aborted, 0 and calved physiologically, 7 (100%).

Hart makes various excuses for some of these seven failing to abort which will impress different people differently. On page 57 he states: "All of these four association animals carried their calves to term, which is evidence that under natural infection the period of time required for the production of

abortion is longer than when massive infection is given artificially," and then almost immediately adds, "Once abortion appears in a herd, the pregnancies of the remainder of the animals are liable to be terminated prematurely by infection." The two statements are contradictory. He certainly failed to show by his experiments that there was any danger whatever from the association of healthy pregnant females with aborters.

Hart records that nine (30%) of his vaccinates were sterile, which he attributes to the vaccination. Bland[10] also reports severe sterility among his vaccinates, but not so high a rate as Hart. Barker[5] is the first British practitioner to report accurate clinical observations upon this point. He observed the results of vaccination in two herds. In one, twenty were vaccinated, of which ten (50%) had to go to the butcher on account of sterility, one aborted and nine calved. In another herd twelve were vaccinated, with seven (58%) sterile. I have reliable unofficial reports of similar vaccination results in this country, but thus far, until this publication by Hart, no American veterinarian has recorded this destructive phase of abortion vaccination. But Hart passes over it rather softly. Every practitioner of experience knows well that intelligent clients will not tolerate such results in their herds.

Biologics Widely Employed

Abortion serums, bacterins and vaccines have been extensively advertised for more than ten years by numerous commercial concerns. Their use has been advocated by numerous laboratory workers, they are licensed by the U. S. Department of Agriculture as *harmless* and capable of benefitting the breeder, the Canadian Department of Agriculture sends out vaccines, the Department of Agriculture and Fisheries of Great Britain apparently advises vaccination. With all this theoretical, political and commercial backing, one would expect that bovine infectious abortion would have, ere this, become a memory, but no data exist to indicate or suggest that the reproductive ratio in cattle has advanced a fraction of one per cent since Bang's discovery in 1896.

The fundamental obstacle to advancement lies with the practitioner and the breeder, owing to their failure to record publicly their observations. The luxurious advertisements of commercial exploiters of these alleged biologic remedies indicate extensive sales, because they do not invest money in propaganda

unless the veterinary practitioner and breeder are paying the advertising bill. The practitioners and breeders have plenty of data at their command which, if arranged intelligently and published, would relieve the public of the need for longer supporting "controlled abortion vaccination experiments." There is great need that practitioners emulate the courage of Barker[5] and speak out regardless of what promoters, politicians and swivel-chair theorists may think of them.

Hart can find no pleasant avenue of escape from the occurrence of 30% of sterility among his vaccinates. Clinicians are aware that in some large herds, where calves suffer severely from dysentery and pneumonia, the heifers are largely sterile at breeding age or having conceived, largely abort. The generally accepted theory of bovine infectious abortion excludes the thought that a calf could carry to breeding age the Bang infection which would cause abortion in first pregnancy. As for sterility, this avenue of retreat is closed to Hart, because barrenness is a *sequel* to bovine infectious abortion, not a primary infection. So if Hart would suggest that his heifers were already sterile when he selected them, he would get the consequence jammed in front of his antecedent.

Some might raise the question of the bull as a possible cause of the sterility. Anyone reading Hart's article hurriedly would probably get the impression that all the sterility occurred in the vaccinates. This is erroneous. On page 52 Hart records that 183, 430-A, and 2317 failed to conceive after 62 days in pasture with the two experiment bulls. When later bred to other bulls, they conceived at once. These three were members apparently of a group of 11 unvaccinated controls. So it appears that among the unvaccinated controls bred to the experiment bulls there was a sterility ratio of 27.3%, compared with 30.0% in the vaccinates, a ratio as nearly identical as the numbers in each group would permit.

So far as a careful study of Hart's data will permit, it appears that there were bred altogether, to the two experiment bulls, including the three animals mentioned above and later bred otherwise, 41 females, with the following results:

Died from accident while pregnant	1 =	2.4%
Sterile	12 =	29.3%
Aborted	6 =	14.7%
Calved pathologically	3 =	7.3%
Calved physiologically	19 =	46.3%
	41	100.0%

Including the three females unsuccessfully bred to the experiment bulls, which readily conceived later when bred otherwise, seven animals were bred to other bulls with the following results:

Sterile	0
Aborted	0
Calved pathologically	0
Calved physiologically	7.0=100.0%

The table on page 43 indicates that the experiment bulls, apparently only 15 months old, were frequently caused to copulate with two cows per day, a rate which would imperil the breeding efficiency of an average adult bull. Much of the time the two bulls were at pasture with the 41 females. On page 53 it appears that bull 411-A became a physical wreck under this severe strain and was withdrawn from service. Hart cannot seriously consider the bull as a factor in the sterility, abortion and retained afterbirth, because he is conducting researches upon a female complaint, not upon bulls.

Conclusions Not Reconcilable

So Hart finds himself with his back to the wall, without any agreeable avenue of escape regarding the sterility, and attributes it to vaccination as the least disagreeable excuse. Hart offers no reasons for attributing his sterility to vaccination, although there is logical reason for anticipating such results, and the literature upon the subject is heavily loaded with convincing evidence. Pleasant escape from the sterility question is impossible for the orthodox contagious abortionist. If he attributes it to disease in calfhood, he repudiates the theory that bovine infectious abortion is an infection invading the pregnant female, causing abortion of the existing pregnancy, and constructively denies the possible value of vaccination; if he charges the bull with the sterility, he again repudiates the theory of infection *during* gestation; and when he admits that vaccination causes the sterility, he absolutely condemns vaccination because the losses in his experiments are unbearable.

Except for the 30% of sterility in his vaccinates, Hart had already reached his conclusions when he began his investigations. Thus he says,[15] "In our opinion owners are justified in using this method in heavily infected herds." In his article now under consideration,[4] as already noted, he makes it perfectly clear that in his estimation vaccination had already been proved a definite success, as shown by his so presenting the

publications of Bang,[1] MacFadyean and Stockman,[2,3] and Hadley,[9] as to make it appear that these investigators had definitely established the great value of vaccination. Hence he sets himself to the task of convincing others. He almost wholly ignores in his conclusions the very serious damage caused by the vaccination in the way of illness, abscesses, swollen lymph-glands and poor condition, and places in a subordinate position the 30% sterility in his vaccinates. Naturally his first conclusion is, "The above experiments clearly demonstrate the value of living cultures of *Bacterium abortum* in preventing abortion in the vaccinated animals when subjected to identical infection that produced abortion in controls." This conclusion can easily be lifted out from among the others like a ripe plum from a dish of sour grapes. Of course, it was so lifted out immediately, and appeared—without the sour grapes—as an advertisement of abortion vaccines in the next issue of the JOURNAL OF THE A. V. M. A. It is a common habit to criticize biologic houses for the blatancy of their advertisements, but, as a rule, they take their cue from laborators like Hart, whose positions give their opinions great weight.

Hart's third conclusion, "The ability to produce abortion in susceptible animals by a single exposure to infectious material given by ingestion was demonstrated," is based upon only a part of the facts recorded. He has not visibly taken into account the fact that he could not cause any one of his animals to abort unless pregnant to his experiment bulls.

Studied together the two publications of Hart [4,7] contain some of the most illuminating and important facts yet recorded in the field of the genital diseases of cattle. The regrettable thing is that many vital facts are omitted, that the most valuable of all those recorded are largely so veiled in telling that, except by very great care in reading, they are not seen, and finally that the conclusions in some important respects are not in recognizable harmony with the facts.

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WHAT YOUNG PEOPLE ARE THINKING ABOUT

The Nebraska State Board for Vocational Education has attempted to ascertain what high school boys and girls are contemplating as their life work. This was done through the medium of a questionnaire sent out through the superintendents of education.

The following questions were asked: "What is your choice of life work? If you have not yet decided the matter, what is your preference now?"

A total of 25,914 boys and girls sent in their answers. Twenty-one indicated that they were considering the study of veterinary medicine. This is encouraging, in view of the fact that there were only seven veterinary students from the State of Nebraska in all of the veterinary colleges of North America during the college year 1922-1923.

In the tabulated summaries it is rather amusing to note that four boys indicated that they were thinking of becoming bootleggers, two had their minds made up to become millionaires, while five boys and four girls were going to become politicians. Out of the almost 11,000 boys only one indicated that he was going to be President of the United States.

MEMBERS INDICATE MAKE-UP OF PROGRAM

Members of the Michigan State Veterinary Medical Association will have no kick coming if they are not satisfied with the program of the summer meeting to be held at East Lansing during the latter part of June. Secretary Sales has mailed a questionnaire to every member of the Association, in which the following questions are asked:

1. What operations are you interested in seeing demonstrated?
2. What laboratory test would you like to see demonstrated?
3. Is there any special part of the animal's body of which you would like the anatomy demonstrated?
4. Is there anything else relating to veterinary science, animal husbandry or agriculture that would be of special interest to you or others?

VIBRIONIC ABORTION IN SHEEP

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Considerable losses of lambs, due to abortion, have occurred sporadically in Montana sheep in past years, but the cause of these losses has not been definitely determined. It has been generally considered to be due to poor condition of the ewes, or to some improper feeding condition. Many sheep men, for instance, are of the opinion that the feeding of cottonseed meal to pregnant ewes will certainly cause a large percentage of abortions. In two instances, in 1920, bacteriological examinations of aborted lambs were made without establishing any specific bacterial cause.

During the lambing season of 1923, we made field and laboratory investigations of three widely separated bands of sheep, in which abortion appeared at about the same time. In all these cases the immediate cause of the abortions was found to be infection with a vibrio, corresponding in morphology and in biological and cultural characteristics to the vibrio originally described by McFadyean and Stockman[1]

As far as we are able to determine, the only published report of vibrionic abortion in sheep in the United States is that of Carpenter,[8] on the occurrence of this type of abortion in one band of ewes in New York. He reports bacteriological examination of twenty-three fetuses, from nine of which spirilla were isolated. He also reports the experimental inoculation of two ewes, two heifers and four guinea pigs. The results of the experiments were inconclusive. In view of the fact that so little has been published on this condition in sheep, we thought it advisable to report our observations on its occurrence in Montana.

THE PRESENT OUTBREAKS

The history of the three outbreaks follows. It is not as complete as could be desired, but it was impossible to follow these cases very closely.

Number 1: The first band in which this condition was recog-

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nized was a band of 1200 ewes in the Prickley Pear Valley, near Helena. These ewes were due to lamb about April 1, and abortions started to occur about forty days before lambing. The condition was reported and investigated on March 3. At this time there had been about fifteen abortions in the previous week. The ewes were apparently in good condition, and were being fed alfalfa hay and a little oats. These sheep were visited again on March 8, when it was reported that about fifteen more abortions had occurred. About a week later the sheep were removed to another ranch, and the abortions stopped. The total loss was about fifty lambs from a band of 1200 ewes. The owner reported that the lambs born at full time were normal, and that there was no loss among the ewes.

A noteworthy fact in the history of this band is that during the second and third months of pregnancy these ewes were on a swampy, alkali pasture, where there was more or less standing surface water. The owner reports that about fifteen years ago another sheep man had the same experience with a band of ewes wintered on the same place.

Number 2: This was a band of 1500 ewes on a ranch on the Yellowstone River. They were due to lamb about April 5. They were fed in two lots in adjoining corrals. One was a bunch of 500 that had been bought in the fall, and the other bunch, of about 1000, had been on the ranch two or three years. The 500 began to go down in condition in February, and were put on special feed, but did not improve. They began to abort about March 15, and when first reported on March 23, eighty-two ewes out of this 500 had aborted.

Up to this time no abortions had occurred in the other bunch. About March 25, abortions began to occur in the second bunch, and at this time there were about twenty-five abortions each night, and eight to ten ewes were dying each day. The death of the ewes was apparently due to metritis. Postmortem report on one mentioned small ulcers in the uterus, and on another retained placenta and pus in the uterus. After the first of April, as the time for normal lambing approached, the abortions became fewer, but there was a large percentage of weak lambs, unable to get on their feet and living only a few hours. Losses did not stop entirely until April 15, when the band was practically through lambing. There was a total loss of about 300 ewes and 1200 lambs.

In this case, as in the first band, the water supply is of interest.

The bunch of 500, in which the abortions first appeared, were being watered with water pumped from a shallow well, badly contaminated by surface seepage, while the other bunch watered at the Yellowstone river.

Number 3: This was a band of 2400 ewes in the Yellowstone Valley, but not on the river. These ewes were due to lamb April 20, and on March 15 abortions were reported. This band was visited at once, but aside from the abortions, which were occurring at the rate of eight or ten a day, nothing of importance was observed. Three fetuses were taken to the laboratory and the vibrio recovered in pure culture from the stomach contents. These sheep were hard to reach, and were not visited again. The owner reported steadily increasing abortions, continuing to lambing time, and a heavy percentage of "weak" lambs during lambing. There was a loss of about 250 ewes and 1000 lambs in this band. This band was moved several miles, about the first of April, to which the owner attributes his relatively light loss.

Bacteriological Examination

Bacteriological examination of the field cases included the aborted lambs, placentae, uteri of the aborting ewes, and vaginal discharges of ewes that had aborted. Three fetuses from band 1 showed pure cultures from stomach contents and heart blood. Sixteen fetuses from band 2 were examined, and the vibrio recovered, though in four cases the cultures were contaminated. Three fetuses from band 3 showed the vibrio in pure culture in the stomach contents, no other examination being made. Smears direct from stomach contents, scrapings of uterine mucosa, amniotic fluid, placental cotyledons, and vaginal discharges, showed the vibrio, apparently in pure culture, and the organism was easily demonstrated by the illuminated dark-field method. In each case where the stomach contents showed contaminated cultures, the lamb had lived for some hours after abortion, and apparently some foreign material had been taken into the stomach, after the lamb was dropped.

Cultural Characteristics of the Vibrio

The original cultures were made on serum-agar slants, and part of them were incubated in a closed jar with cultures of *Bacillus subtilis* to reduce the oxygen tension. After three days there was a fairly good growth on the tubes incubated with *Bacillus subtilis*, and a very slight growth on those incubated in

the ordinary manner. The growth of the second generation was slower than that of the first, but at the end of a week was quite luxuriant on slants incubated in closed jars, either with or without *Bacillus subtilis* cultures. Cultures incubated in the open air in the ordinary way were not successful.

In view of the fact that reduced oxygen tension was apparently necessary for the growth of these organisms, we tried the third generation in the medium which we use for routine anaerobic cultivation. This is a brain medium in liver broth as described by Haslam.[4] A good growth was obtained in this medium in twenty-four hours. This medium and serum-agar slants have been adopted for carrying cultures of the vibrio. We are now

FIG. 1—Smear from serum-agarculture of the vibrio of sheep abortion. x 1100.

sealing the serum-agar slants with sealing wax, as described by Smith[5] instead of incubating in closed jars.

The growth of the original cultures on serum-agar was in the form of minute, colorless, dew-drop colonies, coalescing on the lower part of the slant to form a smooth diffuse growth, thicker in some places than in others, and having a smooth, glistening appearance. The color is gray, except in the thick spots, where a buff color develops in old cultures. The growth usually appears first in the condensation water, and gradually spreads in a thin film around the tube between the medium and the glass, as well as developing on the surface of the slant.

In the brain medium there is a slight general cloud, and a

heavier, somewhat mucoid cloud hanging in the center of the fluid portion of the medium.

In dextrose-agar shakes, there develops first a narrow cloudy zone, about 2 mm. beneath the surface. This growth later extends to the surface. Cultures of three strains remained viable on sealed, serum-agar slants, at room temperature, for seventy-four days.

Morphology and Staining

Morphologically, as well as in cultural characteristics, the vibrio with which we have been working corresponds to the organisms described by McFadyean and Stockman and Carpenter, and also to the vibrio of cattle abortion described by Smith. We found the S-shaped forms, or those comprising one complete wave-length, to predominate in the stomach contents and in the liquid media, with only a few longer forms, while on the surface of agar there were many long forms of from two to twelve or more complete wave-lengths.

We found the most satisfactory stain for routine diagnostic work to be Ziehl's carbol-fuchsin.

Experimental Inoculations

In order to satisfy ourselves that the vibrio which we had recovered from aborted lambs was the infective agent causing the abortions, we procured five pregnant ewes, which were due to lamb on May 12. On March 31, these ewes were inoculated as follows:

Two were inoculated, by the mouth, with stomach contents of aborted lambs. The stomachs had been obtained three days before and kept in the ice-box, but microscopic examination of the material showed that the vibrios contained in it were not actively motile.

Two were inoculated intravenously with cultures in brain-liver broth. Each sheep received 5 cc of a mixture of brain-liver cultures of four strains of the vibrio. The cultures were forty-eight hours old and contained actively motile organisms.

One sheep was inoculated intravenously with a suspension in salt solution of the growth on one serum-agar slant of each of four strains of the vibrio. These cultures were four days old.

The two ewes inoculated by the mouth, with stomach contents of aborted fetuses, lambed normally and no vibrios could be recovered from their vaginal discharges. The three ewes inoculated intravenously with cultures of the vibrio aborted, two of

them on April 19 and one on April 20. The vibrio was recovered in pure culture from the cotyledons, amniotic fluid, and stomach contents of the fetuses. Vaginal swabs from all three ewes showed the vibrio in gradually decreasing numbers until May 21, one month after the abortions occurred.

It may be noted here that the band of 500 ewes, from which the five experiment ewes were taken, lambed normally, without any abortions.

After getting the results from this experiment in which the intravenous inoculations of cultures produced abortion, and the inoculation of fetal stomach contents by the mouth failed to produce abortions, three more ewes were obtained for the purpose of checking the above experiment. The ewes at this time were too far advanced in pregnancy for a satisfactory experiment, but the experiment was carried out rather than to wait for another season. The three ewes were due to lamb on May 20 and on May 3, two of them were given, by the mouth, 20 cc each of brain-liver culture of the vibrio. To check this method, the third ewe was given a 5-cc intravenous inoculation of the culture.

All three ewes lambed normally, and the vibrio could not be recovered from placenta or vaginal discharge at the time of lambing.

The failure of the intravenous inoculation to produce abortion indicates that the date of inoculation was so near to the date of lambing, that the time was too short for the organism to establish itself in the uterus, and renders this experiment practically valueless.

Agglutination Tests

Tests were made for the presence of agglutinins for the vibrio in the blood of the sheep used in the experiments. The antigen used was a suspension in carbolized salt solution of the growth on serum-agar. The growth was washed off in .85% salt solution, containing .5% phenol, and the suspension was thoroughly shaken to break up the clumps.

Instead of being killed by heat, the suspension was allowed to stand for about ten days, or until the vibrios were no longer viable. It was then filtered and diluted to a proper density.

The sera were taken on July 12, which was fourteen weeks after the first five ewes were inoculated, and eleven weeks after the three abortions occurred. Blood was drawn from seven ewes which had been inoculated with vibrio cultures or fetal

stomach contents, from one ewe which had been subjected to pasture exposure, and from three sheep which had been used in another experiment and had been running with the vibrio bunch for a short time. One of these three was a wether.

Three dilutions of serum were used in the test, .05 cc, .02 cc and .01 cc of serum being added to 1 cc of antigen, making dilutions of 1-20, 1-50 and 1-100. The accompanying table shows the result of the test. Complete agglutination is recorded as ++ partial agglutination as + and slight agglutination as ±.

Sheep	Remarks	Amounts of Serum		
		.05 cc	.02 cc	.01 cc
1687	Culture intravenously Aborted.	+	—	—
1477	Culture intravenously. Aborted.	++	+	—
687	Culture intravenously. Aborted.	+	+	±
1456	Culture intravenously. Did not abort.	+	—	—
"Y"	Culture per os. Did not abort.	±	—	—
767	Fetal stomach contents per os. Did not abort.	+	—	—
382	Fetal stomach contents per os. Did not abort.	++	±	—
1473	Pasture exposure.	—	—	—
21	Normal ewe.	—	—	—
"R"	Normal ewe.	—	—	—
1416	Normal wether.	—	—	—

It will be seen that agglutination occurred in only the low dilutions, but there was distinct agglutination at 1-20 in all the sheep which had been inoculated, and no agglutination in any of the four controls. In the case of sheep 687, which showed slight agglutination at 1-100, the presence of the vibrio in the vaginal discharge was demonstrated for a longer period than in any other sheep. It is probable that agglutinins could have been demonstrated in higher dilutions during the time that the

infection was active. Two of the ewes were tested soon after abortion and one showed agglutination in a dilution of 1-200.

SUMMARY

During the spring of 1923 it was definitely established that infectious abortion existed in three bands of sheep in different parts of Montana, and that this abortion was immediately caused by the vibrio described by McFadyean and Stockman. The disease occurred in enzootic form, and apparently has no tendency to become epizootic.

In two of the three outbreaks there was opportunity to get a complete history, and there is circumstantial evidence pointing to the probability that the source of the infection was the water supply. In one case the ewes were pastured, during the second and third months of pregnancy, on a swampy pasture where there was stagnant surface water. During part of this time the weather was so mild that the surface water was not frozen. No examination of the water was made in this case. In the other band, the sheep in which the infection originated were watered from a shallow well, located in the corral where the sheep were fed. This water was contaminated with surface water from the corral. Water from this well was collected in July, nearly three months after lambing was completed, and was found to contain spirilla which were similar in morphology to the vibrio recovered from aborted fetuses. This spirillum, however, has not definitely been identified as the vibrio which produces abortion.

The agglutination tests on experiment sheep indicate that this test has a definite diagnostic value, although there has not yet been opportunity to carry out the test on sheep in naturally infected bands.

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INFECTION OF GUINEA PIGS VIA THE CONJUNCTIVAL MUCOSA WITH THE BACILLUS OF BOVINE INFECTIOUS ABORTION

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The data briefly presented in this article may serve to call attention to the eye, or, more definitely, the conjunctival mucosa, as a portal of entry for pathogenic microorganisms, which merits more consideration than it commonly receives, and, further, to the important fact that the location of the lesions of an infectious disease in the body is not a reliable index to the mode of infection, or the channel through which the infection entered.

About ten years ago, Calmette, Guérin and Gryses[1] demonstrated that, if a small particle of tuberculous sputum or a drop of culture of the tubercle bacillus was placed on the eye-ball of a guinea pig the result was the development of typical, glandular tuberculosis without the slightest lesion in or about the eye.

A contemplation of this work, which has received experimental confirmation at the Experiment Station and elsewhere, prompted the following tests, the object of which was to determine whether the bacillus of bovine infectious abortion can enter the body through the conjunctival mucosa, and, if it was shown that it could, either with or without lesions at the point of entrance, to measure the relative severity of exposure via the conjunctiva and through ingestion.

During the winter of 1923-1924, two suspensions of pure cultures of the Bang abortion bacillus in physiological salt solution were prepared. The cultures were strains of bacilli which had undergone a number of transfers on artificial culture media (agar-glycerin-glucose), and were originally isolated, one from an abortion-infected cow and the other from an abortion-infected sow. The tubes from which the growth was taken had grown two days in an atmosphere which contained about 15% of carbonic acid gas, and the suspensions were about five times as rich in bacilli as those commonly used for making the agglutination test for bovine infectious abortion.

[1]Tubercle Bacillus Infection and Tuberculosis in Man and Animals by Calmette. Authorized Translattion by Soper & Smith, page. 132.

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The following exposures were made with the suspensions: 12 guinea pigs received each a subcutaneous injection of 0.25 cc, 24 guinea pigs received each one drop on the tongue, 24 guinea pigs received each one drop on the eye, and 24 guinea pigs, untreated, were confined in the cages with the eye-exposed pigs.

Half of the guinea pigs received, or were exposed to, the suspension made with the cow strain, and the other half received, or were exposed to, the suspension made with the swine strain.

About two months after the exposure the guinea pigs were killed and examined post mortem. The results are presented in the two following tables:

SUSPENSION OF ABORTION BACILLI, BOVINE ORIGIN

Number of Guinea Pigs Used	Kind of Exposure	Dose of Suspension	Abortion Lesions Present	Abortion Lesions Absent	Percentage of Infection
6	Subcutaneous injection	0.25 cc	4	2	66⅔%
12	Tongue	1 drop	0	12	0%
12	Eye	1 drop	4	8	33⅓%
12	Cage	0	0	12	0%

SUSPENSION OF ABORTION BACILLI, SWINE ORIGIN

Number of Guinea Pigs Used	Kind of Exposure	Dose of Suspension	Abortion Lesions Present	Abortion Lesions Absent	Percentage of Infection
6	Subcutaneous injection	0.25 cc	6	0	100%
12	Tongue	1 drop	7	5	58⅓%
12	Eye	1 drop	12	0	100%
12	Cage	0	7	5	58⅓%

The object of the subcutaneous injections was to have a check on the viability and virulence of the bacilli in the suspensions, and the object of confining the otherwise unexposed or untreated with the eye-exposed guinea pigs was to have a check on the number of infections among the latter, reasonably chargeable to other modes of infection than via the conjunctiva, as it was assumed that the environment of the eye-exposed guinea pigs would become infected with a considerable portion of the

suspension dropped on their eyes and discharged from them before it could be absorbed by the conjunctiva.

The swine strain of the abortion bacillus proved of much greater virulence for the guinea pigs than the bovine strian, and this is accordant with the conclusion derived from a number of tests made in the past on the relative virulence for guinea pigs of the two strains. Apart from this, the results obtained, respectively, with the bovine and the swine strains, are reciprocally confirmative.

The bovine strain, though its virulence was sufficient to infect only two-thirds of the guinea pigs that received each a subcutaneous injection of 0.25 cc of suspension, and not sufficiently virulent to infect a single one of the dozen guinea pigs that received each one drop on the tongue, actually caused the infection of one-third of the guines pigs that received each one drop on the eye. And that the infection of the eye-exposed guinea pigs was via the conjunctiva is a conclusion strongly supported by the entire absence of infection among the twelve guinea pigs confined in the cages with the eye-exposed.

Probably a much smaller amount than 0.25 cc of the swine bacillus suspension would have infected 100% of the subcutaneously injected guinea pigs. This suspension also infected 100% of the eye-exposed guinea pigs, while 41⅔% of the tongue-exposed and the same per cent of cage-exposed guinea pigs escaped.

The distribution and magnitude of the lesions in the bodies of the guinea pigs varied greatly but not in a way serviceable as a guide to the channels of infection, excepting in the case of the subcutaneously injected animals, several of which had lesions at the points of injection and in the adjacent lymph glands. For example, among the 10 guinea pigs that showed lesions as the result of subcutaneous injections, which were made under the skin on the inner side of the thigh, the epididymis was affected 5 times, and among 23 guinea pigs that showed lesions as the result of tongue and eye exposure, the epididymis was affected 12 times. In other words, though the germs in one case entered at one end of the body and in the other case at the other end, the percentage frequency with which an organ was affected, that seems in guinea pigs to have a special affinity for the bacillus of bovine infectious abortion, was practically the same in both cases.

Among the 16 guinea pigs that became infected through eye exposure, only one showed an eye lesion, but not in the conjunctiva or on the eye. It was located back of the eye-ball, in a place where swine strains of the abortion bacillus, no matter how they enter the body, not rarely cause lesions in guinea pigs.

The experiment supplies strong evidence for the conclusion that the eye of the guinea pig is an excellent portal of entry for the bacillus of bovine infectious abortion. But, as we could not conclude from this without further consideration that the same is true of other species of animals, additional experiments with cattle and swine in the place of guinea pigs were at once planned and are now in progress.

The experiment illustrates that the location of the lesions of an infectious disease in the body of its victim is not a guide to the channel through which the causative agent entered. Pathogenic microorganisms are parasites, and parasites not only have definite hosts but definite portions of the bodies of their hosts in which they live and cause disturbances, and a parasite's favorite location in the body of its host often is far removed from its portal of entry, and portals of entry for parasites are various and numerous.

The fact that the favorite habitat of the bacillus of bovine infectious abortion in the cow is the pregnant uterus and that tuberculosis more commonly attacks the lung than other organs does not prove that the abortion bacillus enters via the vagina and os uteri or the tubercle bacillus via the trachea and bronchi, precisely as the presence of hookworms in the intestine does not prove that they entered via the mouth or rectum or the presence of hypoderma larvae under the skin of the back that they bored their way to this region through the skin or that the warble fly punctured the skin and deposited her eggs beneath it.

EASTERN STATES TUBERCULOSIS CONFERENCE

The fifth annual Eastern States Conference on Tuberculosis Eradication in Live Stock will be held at Albany, N. Y., June 10-11, 1924, under the auspices of the live stock sanitary officials of the Eastern States, the New York State Veterinary Medical Society, the New York Bureau of Farms and Markets and the U. S. Bureau of Animal Industry. A very comprehensive program has been arranged.

BACTERIUM ABORTUM (BANG) ISOLATED FROM THE FETUS OF AN ABORTING MARE

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On a farm near Clear Lake, Iowa, abortions occurred during the spring of 1922 in several cows, a few sows and one mare. The aborted fetus of the mare was delivered to this laboratory on April 3, the day following the abortion. The fetus was apparently seven or eight months developed. No membranes were included in the shipment. Autopsy revealed the various organs normal in size, development and position, and showing no signs of traumatism. Changes were noted in the trachea, thorax and spleen. The trachea was congested. The serous surfaces of the chest cavity, including the visceral and parietal pleura, also the epicardium and pericardium were petechiated. These lesions were not considered particularly significant since similar ones had been observed previously in feti of mares aborted from various causes. The lesions of the spleen consisted of thick, smooth, white nodules of exudate not extending to any considerable depth in the pulp. The Malpighian corpuscles were large and conspicuous. These changes in the spleen so closely simulated those observed in the spleens of guinea pigs killed by injection of the organism of cattle abortion that interest in the case was aroused and efforts made to determine the presence or absence of the organism of Bang.

With this in mind, cultures were made on slanted hormone-agar, from various organs, and incubated aerobically for 24 hours to permit the growth of aerobic organisms present. The results were negative. The tubes were then incubated for 96 hours in an atmosphere of approximately 10% CO_2 gas. About thirty good sized, opaque colonies developed, all of which proved subsequently to be one and the same organism. These organisms were small, pleomorphic, varying in shape from coccoid to rod, up to 2 micra in length. Most of the forms were rod shaped and many showed granular or polar staining. They were gram-negative, non-motile and neither capsules nor spores were produced.

The semi-anaerobic character persisted for eight months in

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spite of numerous transfers, being more persistent than in any strain of bovine abortion organism previously isolated in this laboratory. Neither acid nor gas was produced in dextrose, levulose, galactose, maltose, mannite, saccharose, dextrin, xylose, arabinose, dulcite, inulin, mannose, salicin or raffinose. Cultures in lakmusmolke showed slight alkalinity. No indol was formed and the brownish pigment, which has so frequently been reported but which we have found uncommon in cultures isolated in this laboratory or in cultures submitted by other laboratories, was lacking. Agglutination tests with the organism were conducted. Various sera, positive against an antigen of the Bang organism, from cows and one goat, were tested against an antigen prepared from the organism from the foal and also against antigens prepared from organisms of bovine, caprine and porcine origin. All sera gave positive agglutination against all antigens in varying dilutions. Negative sera from normal animals gave negative results with all antigens.

Serum from the mare that aborted the foal gave positive agglutination with all the above antigens. An antigen prepared from a culture of *Bact. abortum equi* was not agglutinated by the serum from this mare.

Agglutination tests of serum from eight cows from the farm where this mare was owned gave positive agglutination in five cases against a known antigen of *Bact. abortum* (Bang).

A culture of the described organism was submitted to Alice C. Evans and used by her in her study of "The Serological Classification of *Brucella melitensis*" (Public Health Reports. Vol. 38, No. 34). Together with ten other cultures of human and bovine origin it came under group six which is designated by her *Brucella melitensis*, var. melitensis A.

SUMMARY

An organism which laboratory study has shown is without doubt a member of the abortion-Malta fever group and which is apparently the bovine abortion organism has been isolated from the foal of an aborting mare.

According to a press report, the organism of foot-and-mouth disease has again been isolated and cultivated, this time by Professor Frasch and Doctor Damman, of the Berlin Veterinary Institute.

VASECTOMY AS A VETERINARY OPERATION

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Vasectomy may be defined as the surgical removal of part of the vas deferens. In brief, the operation is performed by ligating the vas deferens in two places, about half an inch apart, and removing the portion between the ligatures. This effectively dams back the seminal fluid and, if the operation is performed bilaterally, renders the animal sterile, but does not reduce his sexual desire.

Vasectomy in Experiment Animals and Man

The operation has long been practiced upon laboratory animals, such as rabbits and guinea pigs. Following Steinach's rejuvenation experiments in Germany upon rats and other animals, it is said to have been favorably received by the medical profession in Germany as an operation to rejuvenate old men. So far as we are able to learn, vasectomy has never been put to a practical use in the case of farm animals. In experimental breeding work with rabbits, vasectomized males are often used as "teasers," for which purpose they are highly satisfactory. Whenever the experimental work involves artificial insemination in rabbits, these teasers are practically a necessity, owing to the fact that the doe does not ovulate until stimulated by the act of copulation.

Use of Teasers in Horse Husbandry

In farm animals, with the exception of sheep, there is usually no difficulty in detecting females which are in heat. However, in South America and some other countries, a special kind of teaser is used with mares. This is a scrub stallion which has been operated upon in such a way as to prevent copulation. The operation consists of an incision over the penis back of the scrotum, through which the penis is pulled and left hanging. Vasectomized stallions might well be used in place of these "rufiãos," as they are called.

Practical Use in Sheep Husbandry

In pure-bred flocks of sheep, several rams are often needed for stud service. Unfortunately, all the rams can not be pastured

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with the ewes if the individual pedigrees are to be kept. A common plan is to pasture the ewe flock together and to yard them at night in a pen adjoining that of the rams. The ewes which are in heat will come to the fence, are selected out by the shepherd and bred to the desired rams. In large flocks, ewes may be missed by this method. Another plan is to use for a teaser a ram wearing a cloth apron. This works better, except that accidents do sometimes happen. Yet a third method is in use, in which the ram is controlled by a long leash and is turned with the flock twice a day. This has obvious disadvantages. Therefore, in view of the shortcomings of these various commonly employed methods, it is our opinion that vasectomized rams can be used to excellent advantage as teasers in valuable flocks.

Effect Upon the Animal

Successful vasectomy does not inhibit the secondary sexual characteristics or the sexual desire of the subject. If any change does take place, it is rather an increase than a decrease in the sexual desire. Physicians in this country who have operated upon defective men maintain that there is no effect except rendering the patient sterile. Our experience with the operation on a limited number of animals leads us to believe that the effect on them, if any, is a slightly increased sexual stimulation.

Effect Upon the Testicular Tissue

The tissue of the testicles of vasectomized animals often shows degeneration of the germinal epithelium. This has been attributed to the pressure of the spermatozoa which have been dammed back. The only portion of the germinal epithelium remaining in the tubules of such a testicle is a single layer of sertoli or nurse cells. Between the tubules, the interstitial cells will be found either unaffected or increased in number. Undescended testicles, as well as testicles experimentally replaced in the abdominal cavity, show the same histologic picture. Sometimes the germinal epithelium of vasectomized animals remains functional and spermatozoa are formed. These are retained in the tubules, finally degenerate and are resorbed. In neither case is the formation of the internal secretion which stimulates the formation of secondary sexual characters prevented.

Technic of the Operation

The technic of the operation is simple. The steps which we follow in performing the operation are as follows:

(1) Fast the animal for twelve hours.

(2) Restrain the animal in the dorsal position.

(3) Administer an anesthetic, such as chloral or chloroform.

(4) Give a prophylactic dose of tetanus antitoxin.

(5) Clip, shave and wash the field of operation in the inguinal region, then dry it and paint with tincture of iodin.

(6) Sterilize the following instruments: scissors, razor, scalpel, bistury, several artery forceps, curved needles, needle holder, and silk suture.

(7) Incise the skin and fascia over the spermatic cord, and dissect out the fatty tissue overlying the tunica vaginalis communis.

(8) Palpate the spermatic cord to locate the vas; then incise the tunic over the vas.

(9) Separate the vas from the blood vessels and nerves, then grasp it with artery forceps.

(10) Ligate the vas, anterior and posterior to the artery forceps, then cut between the ligatures and forceps. Save the incised portion for microscopic examination.

(11) Suture the tunica vaginalis; then suture the skin separately. We prefer Glover's stitch no. 2 in the ram and boar.

Unfavorable Sequellae

Of the accidents that may follow should be mentioned (1) abscess formation, (2) atrophy of the testicles, (3) tetanus, and (4) infection of the females with pus organisms from service to vasectomized males. With reasonable care, good technic, and sterilized instruments these accidents are unlikely, so a favorable prognosis may safely be given.

Conclusion

In conclusion it may be said that (1) this novel operation can be successfully performed in the field; (2) there should be a demand for the operation from sheep breeders, if they are informed that it can be performed by their veterinarians; (3) vasectomy is very interesting because of the general biologic questions with which it is concerned.

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THE RETURN OF THE HORSE

Philadelphia spends annually $108,000 for shoeing the horses belonging to the city. This seems incredible. But Philadelphia owns 1,700 horses that are used in street cleaning service. The horse is not extinct. Boston, Baltimore, New York and other cities all report large numbers of horses in municipal service. From London comes the report that there are more horses used in that city today than ever before.

Not only in this country, but in other countries the express companies are bringing back the horse for city delivery purposes. Many business houses have compiled statistics that have convinced them that the horse is cheaper than the auto for delivery service that involves short hauls and many stops.

There are many indications that the horse is coming back. This is not without significance to farmers and breeders of horses. Nor is it without significance to the sociologists who tell us that human nature is more easily controlled and directed, when men make use of domestic animals, than when they live almost exclusively in a mechanical world. Possibly the bark of a dog and the neigh of a horse always will appeal more strongly to humanity than the honk of an automobile horn.

(Editorial in the Cedar Rapids (Iowa) *Evening Gazette*.)

CATTLE ABORTION DISEASE
LANTERN SLIDE LECTURE
FAIRS 1923

The Pennsylvania Bureau of Animal Industry introduced a novel feature at the county fairs in Pennsylvania during the past season, in the form of a continuous automatic, lantern-slide lecture, prepared by Dr. M. F. Barnes, on bovine infectious abortion. The slides contain the following information:

1. Infectious abortion in cows is caused by a germ called *Bacterium abortus* (Bang).
2. As high as 92% of all cows in a herd have been known to abort in one year. 37% aborted the next year.
3. The question of abortion in cattle is of very grave importance to the agricultural industry.
4. The losses encountered by infectious abortion are recognized to an appreciable extent, only by those who have experienced a scourge of it.
5. Infectious abortion probably causes more direct loss than any other disease of cattle in this country.
6. Abortion interferes with the propagation of certain blood lines of certain outstanding families.
7. Abortion interferes with the amount of milk production.
8. Abortion hinders the selection of the best individuals for breeding stock.
9. Abortion limits the number of valuable offspring.
10. Abortion is the cause of a large percentage of sterile cows.
11. Abortion causes calf loss, interferes with the amount of milk, deranges the physical condition of dam, and causes sterility.
12. Abortion may occur in any stage of pregnancy.
13. Cows abort once, twice, three times or oftener.
14. Abortion-infected cows become lifetime carriers of abortion infection in the udder.
15. Abortion is spread by introducing cattle from one herd into another without using precautions.
16. The aborting cow is thought to be the most dangerous spreader of abortion infection.
17. An abortion-infected cow does not need to abort to become a spreader.
18. Next to the aborting cow, infected cows are dangerous spreaders of abortion germs at calving time.

19. Bulls become infected with abortion disease and may become spreaders.
20. It is cheapest to consider all cases of abortion infectious.
21. Too many first abortions are considered mechanical or accidental, and to the breeders' sorrow.
22. No case of abortion should be considered mechanical or accidental until proved not infectious.
23. To handle the first case of abortion cautiously and correctly may mean the saving of a large number of calves.
24. Infectious abortion is a wasteful, neglectful disease, and can be prevented.
25. The recurrence of abortions in some herds has been apparently traceable to reacting cows which have calved normally being kept in the herd.
26. The *usual* system of herd management tends to keep active, instead of eliminate abortion infection.
27. The proper system of herd management would often prevent the first abortion as well as those which follow.
28. The proper system of herd management includes a system of disease prevention and control.
29. The herdsman should see every pregnant cow every day whether in pasture or stable.
30. Every cow showing signs of calving or abortion should be removed from the herd to a maternity stall.
31. Every cow in any abortion-infected herd should be handled with as many precautions as though she were known to be infected.
32. The maternity stall should be well cleaned and effectively disinfected before a cow goes into it for calving.
33. Always aim to use a good, reliable and effective disinfectant.
34. All afterbirths and aborted or dead calves should be immediately burned or buried.
35. Manure piles should not be in the exercise or feed yards.
36. No cow should have access to manure piles at any time.
37. Herd bulls should not be used to serve neighbors' cows.
38. Veterinarians, breeders and herdsmen should be slow in becoming discouraged when attempting, by proper measures, to eliminate abortion from the herd.
39. In abortion prevention and control work, patience, perseverence, close observation of individual members of the herd, and proper action at the right time, are duties of every herdsman.

40. Members of bull clubs should exercise extreme precautions as pertains to abortion and other transmissible diseases.
41. Too much has been said in literature available to breeders, of proposed, useless, and probably harmful remedies, and cures of abortion.
42. No vaccine is known that will prevent abortion in cows. No cure is known. It can be prevented.

DR. STANGE MAKES COMMENCEMENT ADDRESS

Dr. C. H. Stange, Dean of the Division of Veterinary Medicine, Iowa State College, and President of the A. V. M. A., delivered the commencement address at the exercises which marked the completion of the College course of seventy-three students at Iowa State College, on March 19, 1924. Dr. Stange's address was entitled "The Biology of Government." He said, in part:

"Government, like the individual, needs a well developed nervous system to control its complex functions. The growth of government," he said, "tends toward the development of specialized groups, just as the growth of animal life produces groups of cells that perform particular functions."

"If any group of specialists in the country," he declared, "ceases to function, the whole body of the state suffers." He described as one of the functions of higher education the preparation of men and women to perform these specialized tasks that are essential to a complex society.

SIGMA XI SEES VETERINARIANS AT WORK

The Faculty of the University of Pennsylvania School of Veterinary Medicine entertained the Society of the Sigma Xi, University of Pennsylvania Chapter, at the School, on Wednesday, March 19, 1924. Following is the program for the evening:

Leonard Pearson Hall, Lecture: "Veterinary Work in Relation to Public Health," Dr. L. A. Klein.

Operating Room, Lecture and Demonstrations: "Placing Horse on Operating Table," and "Chloroform Anesthesia of the Horse," Dr. John W. Adams.

Clinic Hall: "Passing Stomach-tube on the Horse," and "Intradermal Tuberculin Reactions on Cow and Chicken," Dr. V. G. Kimball.

There was a large attendance including a good proportion of ladies.

A UNIQUE FIELD EXPERIMENT WITH WHITE SNAKEROOT

By ALBERT A. HANSEN, *Lafayette, Ind.*

Associate Botanist, Purdue University Agricultural Experiment Station

An experiment unique in the annals of Indiana agriculture, the results of which are of distinct value to the veterinary profession, was recently completed by a group of farmers in Wayne County, Indiana.

The history of the experiment is interesting. The idea originated at a field meeting called by County Agent H. R. Hofford to assist the farmers in locating the cause of the loss of considerable live stock in the vicinity of Hagerstown. In the woods in which the meeting was held, J. H. Gray, the owner, lost $1400.00 worth of live stock within a period of seven days, and additional heavy losses were reported by those present. Since the animals died after exhibiting symptoms typical of white snakeroot poisoning, and since the plant was growing luxuriantly in the Gray woods, the trouble was naturally attributed to white snakeroot. Furthermore, numerous cases of human milksickness and death were reported in the neighborhood. Since the writer has devoted considerable attention to the poisonous plant problem in Indiana, he was requested to address the meeting.

The farmers, however, found it difficult to believe that the plant was the cause of the trouble, and they desired that the poisonous properties be demonstrated to them in their own county. Accordingly, the writer outlined a feeding experiment to be performed by the farmers themselves under the supervision of Mr. Hofford, a former instructor at Purdue University, and a man qualified to supervise an experiment of this character.

The Dalton Township Farm Bureau purchased a Dorset ewe lamb weighing fifty pounds, for the purpose of feeding the snakeroot. The animal was taken out of a cornfield, where it was being fattened, and placed in a comfortable, thoroughly cleaned and disinfected box stall on the farm of Albert Gordon, of Hagerstown. Mr. Gordon and his son were selected to perform the feeding work.

When the experiment began, the ewe was in a fine state of

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health. Good clean water was available to the animal throughout the period of the experiment, and regular daily exercise was given. The ration consisted of one pound of grain per day, fed twice daily and carefully weighed before feeding. In addition, a quantity of white snakeroot was available at all times. At first the weed was chopped and mixed with the grain, but the animal seemed to eat the weed as willingly when fed separately. This, however, is contrary to the experience of other experimenters.

Fig. 1. Characteristic position during a period of trembling. The back is arched and the legs are spread apart to brace against falling.

Since the experiment was started in October, after frost, the weed was fed in a frosted condition. This added a new element to the value of the work, since there is no other experimental data available regarding the posionous properties of frosted white snakeroot, although numerous cases of winter snakeroot poisoning of live stock have come to our attention. The sheep was vigorous and healthy until the twelfth day, when it contracted a typical case of trembles. The symptoms were closely watched, and should be of value to veterinarians. For a few hours preceding the trembling stage, the animal seemed to be getting stiff and lazy, showing marked disinclination toward muscular exertion. It apparently did not want to get up, and when compelled to arise it developed a severe spasm of trembling. The trembling was violent, and during this period the back was arched in a characteristic manner, the legs were spread apart to brace

against falling, and the animal gritted its teeth a great deal. A number of times the sheep would rest while trembling by putting its chin on the ground, the hind legs remaining upright. In this tripod position the animal trembled violently, retaining the odd posture for a considerable period, during which it could hardly be persuaded to assume the normal, upright position. The ewe eventually toppled over, was unable to rise, and died about twelve hours later. Death took place thirty-six hours after trembling first became evident.

Fig. 2. Another characteristic (tripod) position; an attempt to rest during a spasm, animal trembling violently all the time.

It is hoped that this brief description of the symptoms of snakeroot poisoning, and the demonstration of the fact that frosted white snakeroot is dangerous, will be of value to veterinarians in diagnosing cases of white snakeroot poisoning in woodland pastures. The plant presents a problem principally in the Ohio River Valley states, Western North Carolina and Tennessee, although there is evidence that it causes trouble in West Virginia, Pennsylvania and perhaps in other eastern states.

A CORRECTION

In the April issue (p. 122) the name of one of the members of the Washington State Board of Veterinary Medical Examiners was misspelled. Dr. P. G. McIntosh should have been P. G. MacKintosh. He has been a member of the A. V. M. A. since 1921, and is correctly listed in the A. V. M. A. Membership Directory.

CLINICAL AND CASE REPORTS

(Practitioners and others are invited to contribute to this department reports of unusual and interesting cases which may be helpful to others in the profession.)

SOME CASES IN GENERAL PRACTICE

By G. W. Browning, *Mobile, Ala.*

For the past few years I have been so remote from the center of circulation, that I have been unable to attend meetings of our veterinary associations, and other gatherings where veterinarians assemble, and my only way now of keeping posted on veterinary matters is by reading the Journal which is a welcome visitor once a month.

Papilloma in a Bitch

A French bull bitch was presented for treatment at my hospital, with the history of having bled from vulva for a year or more, and as the owner was a tailor and wished to keep his office neat, informed me she kept the floor in a bad condition all the time and if possible, wanted it stopped. An examination revealed a papilloma, about the size of a hen's egg, in the neck of the os, but hanging into the vagina.

Treatment: I made a pessary out of gauze, attached it to the end of a wire, saturated it with tincture of Thuja, full strength, pushed it forwards and upwards till it rested against the tumor. This was held in place by tape, tied around the base of the tail, then around the loins and flank. This dressing was changed every six hours during the day, for one week, when bleeding had entirely stopped, then it was applied only three times a week, then once a week. At the end of six weeks examination showed the growth had disappeared and as the bleeding had ceased some four weeks previously I discharged the patient as cured and got my money for the treatment.

Warts Removed with Thuja

Was called three miles in the country to see a three-year-old cow which was loaded down with warts. They were thickest and largest on the udder, ranging in size from a small marble to a goose egg. Seeing that they were too numerous to extirpate all of them, I decided to cut off only the larger ones, which I did by

casting the animal, and cauterized the wounds with pure phenol. I left the owner eight ounces of pure Thuja (Lloyd's) with instructions to touch every wart once a day with a small, round paint-brush. She came to my office in about three weeks and said the warts I cut off had healed, and the small warts were gradually going away.

I heard no more from the owner of the cow until three months later when I passed by the place. Being anxious to know the outcome, I stopped to see the cow. I found the warts all gone. I gave the cow a cathartic, and left some tonic powders to be given in her feed twice a day.

Eczema in a Cat

A black cat was brought to my hospital for treatment for eczema which had been the rounds to other cat doctors and veterinarians. This was one patient I really did not want to treat, and my assistant said I would have bad luck the rest of my life and not to take it. However, I could not see how I could make it any worse, so decided to take the patient.

Treatment: This consisted of one drug only, all the way through, which was oil of Thuja, full strength, applied twice a week. At the end of three weeks I considered the disease cured, and the cat was taken from the hospital. The owner returned in two weeks and said it looked as if the disease was coming back. I kept the patient one week the second time, gave it two applications, and discharged it again. It was a year last August and there has been no sign of its returning. Fearing I may be accused of using nothing but Thuja in my practice, will diverge by giving the following case.

Fright Disease in a Setter

A seven-months-old setter was brought to the hospital. The owner said that she had "fright disease" and had been having fits for two months. He had treated her for worms and done everything he knew how and wanted me to try to cure her. As she was rather anemic, and the condition had existed so long, I did not want to take the case very badly. Finally I told the owner I would not take the case unless he would leave her at the hospital for at least three weeks, and then I would not guarantee a cure.

Treatment: I first gave her a hypodermic injection of one-twentieth grain of lobelin. In three minutes she vomited four times, thoroughly emptying her stomach of all food and bile.

In about an hour I gave her a laxative, and let her alone until the next day. Then I gave her tablets of hypericum, 3-grain doses, four times a day. This treatment was kept up for ten days, with an occasional laxative. At the end of twenty days the patient was discharged. It has now been over a year, and when I saw the owner a few days ago he said that she was fat and fine and had gone through the hunting season all right.

SWEET CLOVER HAY POISONING

By N. S. MAYO, *Chicago, Ill.*

A dairy farmer and breeder of pure-bred Holstein cattle was sent to the Abbott Laboratories, by his veterinarian, with specimens of blood and tissue for examination. The history of the case, as given by the owner, is as follows:

Several weeks previously, a young Holstein bull had died. This bull was ailing only a day or so and died quite suddenly, with no marked symptoms. The veterinarian made an autopsy. The only notable lesions were hemorrhages around the kidneys and several blood clots of considerable size under the skin. As the bull had been running in an icy barnyard for exercise, it was thought he had injured himself.

A week or ten days later a fine two-year-old heifer was noted "off her feed," in the evening, and there was a swelling "as big as one's fist" on her back. The next morning this swelling was "two feet long and six inches high," according to the owner. The owner's regular veterinarian being away, another veterinarian was called, who was unable to diagnose the trouble, but decided to open the soft swelling. A large amount of what appeared to be pure blood escaped. This heifer died a few hours later. There was no rise in temperature and an autopsy revealed a condition similar to that of the bull. All animals were given a dose of hemorrhagic septicemia bacterin (bovine).

A few days later a yearling heifer was noted ailing. There were no marked symptoms except that the animal would not eat and appeared weak. The second day it died and the autopsy revealed several subcutaneous hemorrhages. Specimens from lungs, liver, kidney, and spleen were brought to the laboratories. In no case was there any crepitus, to indicate the formation of gas subcutaneously, nor was there any discharge of blood from the natural openings of the body. An examination of the kidneys revealed extensive subcapsular hemorrhages, but microcsopic

examination and cultural tests were negative. Questioning the farmer as to the food, he stated that he had been feeding sweet clover hay for about two months, and that one of his boys had some pet rabbits that had died soon after he began feeding them sweet clover hay, but they did not know what killed the rabbits.

Having heard Prof. Schofield's excellent paper on damaged sweet clover hay as the cause of a new disease in cattle, presented at the A. V. M. A. meeting at Montreal and since publicalished in the JOURNAL, a diagnosis of sweet clover hay poisoning was made.

The breeder, an unusually intelligent and progressive man, was given a copy of the February JOURNAL, so that he might read Prof. Schofield's article. He was thoroughly convinced that our diagnosis was correct, and he said, "My cattle get no more sweet clover hay after I get home tonight."

So far as we know this is the first loss of cattle in Illinois that could be attributed to damaged sweet clover hay.

STATE BOARD EXAMINATIONS

Alabama	Auburn.	May 21-22
Secretary, Dr. C. A. Cary, Auburn, Ala.		
Colorado	Capitol Bldg., Denver.	1st week in June
Secretary, Dr. A. N. Carroll, 301 W. 3rd St., Pueblo, Colo.		
Nebraska	Capitol Bldg., Lincoln	June 4-5
Supt. Dept. of Health and Welfare, Lincoln, Nebr.		
Tennessee	State Capitol, Nashville.	June 11
Secretary, Dr. M. Jacob, 312 W. Church Ave., Knoxville, Tenn.		
Arizona	State Capitol, Phoenix.	June 15-16
Secretary, Dr. Z. S. McNess, Glendale, Ariz.		
Washington	Pullman.	June 16-17-18
Secretary, Dr. A. R. Galbraith, Garfield, Wash.		
Mississippi	Jackson	June 17
Secretary, Dr. Wm. L. Gates, Clarksdale, Miss.		
Massachusetts	State House, Boston.	June 19-20
Secretary, Dr. E. W. Babson, 343 Washington St., Gloucester, Mass.		
Arkansas	Old State House, Little Rock.	June 20
Secretary, Dr. J. H. Bux, Old State House, Little Rock, Ark.		
Pennsylvania	Vet. School, U. of P., Philadelphia	June 20-21
Secretary, Dr. H. W. Barnard, 529 E. King St., Lancaster, Pa.		
North Carolina	Blowing Rock.	June 24
Secretary, Dr. Wm. Moore, Raleigh, N. C.		
South Dakota	Pierre.	June 24-25
Secretary, Dr. Carle B. Lenker, Colome, So. Dak.		
Wisconsin	Capitol Bldg., Madison.	June 24-25
Secretary, Dr. T. H. Ferguson, Lake Geneva, Wis.		
Vermont	State House, Montpelier.	June 25-26
Secretary, Dr. Geo. Stephens, White River Junction, Vt.		
Maryland	Baltimore.	June 26-27
Secretary, Dr. Hulbert Young, 515 N. Charles St., Baltimore, Md.		

ABSTRACTS

EXPERIENCE WITH ONE THOUSAND CASES OF ABORTION. David S. Hillis, Surg. Gyn. and Obs., xxxviii (1924), p. 83.

A tabulation of the results of treatment of 100 cases of abortion: They have been divided into two groups, those receiving active treatment and those receiving conservative treatment. Thus, in the first case, the uterus was promptly emptied of the placenta and, if present, of the macerated fetus, while, in the second case, a period of rest was allowed before treatment was instituted. In 100 of 200 cases of septic abortion, observed between the years 1911 and 1916, the uterus was emptied artificially during the febrile period, and as soon as convenient after admission. In the other 100 cases there was no local treatment. The conservatively treated cases had fewer days of fever, a shorter stay in the hospital, fewer complications and a lower mortality.

In the period from October, 1918, to April, 1919, a three-day period was tried. In not a few cases there was an alarming postoperative rise in temperature and the stay in the hospital was prolonged. In the present series of 1000 cases no patients with a temperature of 100 degrees or above fell into the actively treated group, unless for some special indication such as hemorrhage. The writer gives a series of tables, tabulating the results of the treatment. He concludes that the study of 1000 cases of abortion seems to indicate that—

(1) Conservative treatment of abortion in febrile cases gives better results than active therapy.

(2) Febrile patients who have a five-day rest period have a greater tendency to continue a normal temperature after curettage than those who are operated upon before the end of this period.

3. Afebrile patients with a five-day observation period have a greater tendency to remain with a normal temperature than do those who are curetted before the end of this rest period.

4. Approximately 6.2 per cent of patients must be emptied because of alarming hemorrhage.

5. A plan of procedure, which embodies a conservative rest period of 5 days' normal temperature for febrile and afebrile patients and results in as low a mortality as quoted in this paper, seems to be a rational method for the treatment of abortion.

ABSTRACTOR'S NOTE

This article, in dealing with the treatment of abortion in woman, treats for the large part those cases occurring between the first and third months of pregnancy. The active treatment apparently consisted in most cases of the removal of both fetus and placenta. Curettage was done in the actively treated cases in order to accomplish a complete removal of the placentary attachments, thus providing a means by which the fragments of the placenta can be more or less completely removed from the uterus and thus prevent their decomposition. The problem presented is comparable to what is seen in the cow when the placenta is removed at an early period after parturition or abortion and shreds of the chorionic villi remain behind to decompose, although in the treatment of placentitis in the cow no such method as has been employed in woman has ever been devised. In view of the increasing favor towards a conservative method of handling placentitis in the cow, especially amongst the higher bred ones, this article is of considerable comparative interest. Such tabulations as are given by Hillis concerning the comparative value of the different methods of the treatment of placentitis does not appear in veterinary literature. It seems, however, to be the prevailing opinion amongst those who have treated placentitis, both actively and conservatively, amongst cattle, that the conservative handling results in a lower mortality and a greater conservation of the procreative powers of the cow so treated.

W. W. W.

THE RELATION OF THE ENDOMETRIUM TO OVARIAN FUNCTION. Charles C. Norris. Surg. Gyn. and Obs., xxxviii (1924), p. 33.

The writer believes that the endometrium possesses a definite endocrinal function, and that this operates in conjunction with the secretory function of the ovary, and is probably subservient to the latter. There can be no doubt but that the ovary is the dominant endocrinal factor of the female genital tract. It is equally apparent that the ovary functionates with other endocrinal glands as, for example, the thyroid. It appears almost certain that an interrelationship between the ovary and the endometrium exists, and that one structure is to some extent dependent upon the other.

Whether or not the endometrium possesses an endocrinal function is a difficult problem to solve with certainty. The marked activity of the epithelium of the endometrium and the large amount of gland-like stroma, present during the active sexual life of the female, are at least suggestive of an endocrinal action. Patients having a total hysterectomy develop an earlier menopause. When a small portion of the endometrium is left there is a longer period before the occurrence of the menopause and the nervous symptoms incident to the climacteric are less pronounced, simulating more closely those of normal menopause.

In explanation of those cases which develop menopausal symptoms, immediately or very soon after operation, it may be stated that this result is due to lack of function of the ovary.

We believe that the ovary functionates better if a portion, at least, of the endometrium can be preserved. Mayo states that the effect upon patients is essentially the same, whether menstruation is checked by removal of the ovaries and retention of the uterus, or removal of the uterus and a conservation of the ovaries. He adds that he believes that menstruation itself has an important endocrinal function. The endometrium probably possesses a definite endocrinal function, which, like other endocrinal glands, acts in conjunction with certain so-called ductless glands, particularly the ovary, to which it is most likely subservient.

ABSTRACTOR'S NOTE

In the hypothesis that the endometrium has an endocrinal function, there seems to be a plausible explanation of the cause for the cessation of ovarian function in the cow, when associated with serious endometrial disease. In extensive pyometra it is the general rule that ovarian function is seriously disturbed, but a large accumulation of pus is not necessary for the destruction of this function. Endometrial destruction commonly occurs, either from putrefaction of the decidua or the retention of pus in the uterus over a considerable time. In many such cases it is very difficult or impossible to re-establish normal ovarian function. This is frequently illustrated in practice. One such instance is illustrated by figure 183, in *"Diseases of the Genital Organs,"* by W. L. Williams. In this case the general health of the animal was excellent. The ovaries and oviducts were apparently perfectly normal and there was no material accumulation of pus within the uterus or other portion of the genital tract. Ovarian function was completely absent.

W. W. W.

THE REPAIR OF BIRTH LACERATIONS OF THE CERVIX UTERI. Ludwig A. Emge, M. D. Amer. Jour. Obs. and Gyn., vii (1924), p. 16.

An investigation was made of cervical lesions in regard to their sequelae among women. The study was begun by centering attention on the sequelae of birth traumas and their relation to other disturbances of the generative organs. It has been conservatively estimated that some 40% of cervical lacerations ultimately lead to further pathology, while the remaining 60%, which is made up of small lacerations that have healed spontaneously by granulation, cause no further disturbance, as far as we know today.

The majority of severe lacerations may be productive of further pathology and commonest among the resulting lesions are erosions with low-grade infections, cystic degenerations and various degrees of cervicitis. Commonly, the process ends in hypertrophy and fibrosis of the fundus of the uterus, often faultily called metritis. It is further pointed out that all of these lesions, either simply or as a whole, have a bearing on sterility.

Considering the great number of disturbances that may arise from cervical lacerations, we should aim to prevent healing by granulation of these tears and promote primary union of the torn surfaces by some method of repair, either as immediate trachelorrhaphy, at the end of labor, or as intermediate trachelorrhaphy, during early puerperium. With this aim, every cervix was examined at the end of the third stage of labor and all cervical lacerations, extending into the connective tissue, were immediately repaired. Out of 700 successful deliveries, it was necessary to repair cervical lacerations in 73. In primiparous women, the results of the trachelorrhaphy were best and failures were negligible. In multiparous women, healing of immediate repairs is less successful because new tears follow the lines of old tears, exposing avascular areas of scar tissue which are not given to healing by simple approximation.

In light of more recent observations made in our wards, we feel that cervical repair should more nearly have approximated the 40% level. To object to either immediate or intermediate cervical repair, just because the lesions will heal in some fashion, is short-sighted and defeats the aim of prophylactic medicine. In conclusion, it is claimed that cervical repair at the end of the third stage of labor is feasible and advisable, if it is performed by an experienced obstetrician, under ideal conditions and proper surroundings. It requires the development of a special technique and experience in recognizing cervical lacerations at this period.

W. W. W.

VETERINARY STATION HOSPITAL
THE CAVALRY SCHOOL, FORT RILEY, KANSAS
Photo shows main building and isolation ward in the distance. There are accomodations for 51 patients. This establishment is said to be the most modernly equipped veterinary hospital in the army.

AMERICAN VETERINARY MEDICAL ASSOCIATION

Proceedings of Sixtieth Annual Meeting, Montreal, Canada. August 27 to 31, 1923

(*Continued from p. 105, April Journal*)

TUESDAY MORNING SESSION

SECTION ON GENERAL PRACTICE

August 28, 1923

The meeting of the Section on General Practice convened in Dining Room "D," Mount Royal Hotel, Montreal, Canada, Chairman H. E. Kingman presiding.

CHAIRMAN KINGMAN: Gentlemen, let's come to order and listen to a paper on "Cesarian Section in the Cow," by Dr. T. H. Ferguson, of Lake Geneva, Wisconsin. Dr. Ferguson.

DR. T. H. FERGUSON: Mr. Chairman and Gentlemen, I didn't prepare a paper on this subject. I will just make a few brief remarks relative to my experience with it in the field. Dr. Kingman informs me that we will have an opportunity to demonstrate the operation at the clinic tomorrow. In fact, I thought my talk was to be given at that time.

For a number of years we have been using this operation in practice in certain cases. In all cases where the maternal pelvis was too small, smaller than the fetus, where it was difficult to perform embryotomy, after giving a fair trial with traction and handling the case along that line, we have of late years proceeded to the operation at once before the animal gets into bad condition, and we have had, in that class of cases, close to one hundred per cent recoveries, saving both the cow and the calf.

We have also performed it in cases of dystocia, where the fetus had died and become emphysematous and it wasn't practical to try embryotomy for one reason or another; sometimes a torsion of the uterus, and other times the fact that some one had been working on the case and got the soft tissues lacerated and inflamed so that it was difficult to operate within the uterus, we have found that cesarian section is indicated.

The condition known as *schistocormus reflexus* is another condition that we have had an opportunity to remove that way. Very often in those cases we not only have to do the cesarian

section, but embryotomy, as well. It is necessary to dissect the fetus before it can be delivered.

Of course, a good many such cases we get too late to save even the cow, but we have found that it saves a lot of labor; it gives the cow a much better chance for recovery and there is less pain attached to the operation. You all know embryotomy is a long-drawn-out affair in those cases. There is the exposure to the operator, exposure to infection and the tedious part of it. Of course, if there is a better chance for embryotomy than the other, why, we prefer that, but otherwise we proceed with the operation.

The cases in which you will get the best results are those that I mentioned first, where the smallest diameter of the fetus is much larger than the largest pelvic diameter of the cow.

I will describe the operation now, the way we handle it in the field. Usually we get these cases at night. There are very, very few of them that we get in the daytime.

After deciding to operate we assemble the instruments, and usually call for the housewife's boiler, put the instruments and dressing material in, with the exception of the cutting instruments. We place these in a 90% solution of phenol. While we are preparing the animal, we usually cast her, if she isn't already down; if she is already down, we roll her in a comfortable position, and if she is very nervous we administer chloral. We use from an ounce to two ounces of chloral in from a pint to a quart of hot water, pumping it into her stomach.

We shave the hair from the region of the transverse processes of the lumbar vertebrae down to the median line between the external angle of the ilium and the last rib, after the hair has been clipped and the surface washed off. We usually shave a strip about four inches wide in that region Then we make the injection of the local anesthetic. If it is slow-acting, we inject it before we shave off, carefully injecting it into the skin and then, later on, we inject some more into the muscles.

We have operated on some cases in the standing position. If the animal needs to be cast we prefer stretching it and restraining it, by tying the front feet to a post, and hind legs, in the opposite direction, to posts or rings in the floor, if it needs to be restrained to that extent. A good many times, in fact almost always, an animal can be restrained by fastening the rope around the ankle of one front leg and over the withers, to the opposite leg, rolling the animal up onto the sternum, and have a

rope fastened around the hind legs so that in case you need it, it will be there, but if you just roll them up on the sternum, especially after they are narcotized with chloral and have a local anesthetic, they don't bother very much.

It is well to have a man at the head, to keep it around to the side, so that they won't try to lie out flat. Usually that is the most convenient position to get the fetus up to the opening, after you make the incision.

We used to make a vertical incision, anywhere from fifteen to eighteen inches long—sometimes a little longer—through the skin. It is very essential to have a long incision through the skin. You want to get that large enough because the skin won't tear; neither will it stretch very much. A skin incision must be ample to take case of the passage of the fetus.

Formerly we used to make a transverse incision down to the peritoneum and then operate from there on through the uterus, bringing the uterus up as near the outside as possible. Sometimes everything is favorable, and you can present some part of the fetus to the outside. Again it is impossible to do that right away. You have to pack the wound and cut down carefully on to the fetus, and in the process of delivering it the uterus will come up and you will have to guard against the passage of any fluid in the abdominal cavity as best you can. You can do it fairly well in most cases. Take the first cases I spoke about. The fluid isn't so very dangerous if it happens to drop into the uterus; that is, a small amount of it can be taken care of. Of course, if it is an emphysematous calf, or anything of that kind, there is great danger of getting the fluid in the abdominal cavity, but there usually isn't much fluid in those cases. At any rate, it is absolutely necessary to pack the abdominal cavity to a certain extent and not only prevent the fluid from getting into the abdominal cavity, but keep the intestines back.

Very often you will have difficulty in making an incision into the uterus—you will have difficulty with the intestines. They will fill with gas, and it is necessary to insert a small trocar. In other cases we can work them into a sack. In the field we usually use flour sacks for packing material. They are very convenient. They are most always clean to start with, and to make them further safe, we just throw them into the boiler and boil them with the rest of the instruments.

It doesn't matter particularly how you make the incision. You cut through the skin and muscles to the peritoneum, then

pick it up and divide it and then, as I said before, present the uterus.

Formerly we used to make a transverse incision down to the peritoneum, but now we find it is much better to make the incision through the skin and be sure and get it long enough; then make the incision obliquely downward and backwards to conform with the direction of the external oblique muscle. It is well to center your incision and then work down the external oblique and well up on it. Get a good long incision in the external oblique muscle and then do the same thing as near as you can with the internal oblique, but in the opposite direction.

Then cut through the transverse muscle of the abdomen to the peritoneum and pick that up and make a good long incision in the peritoneum. If you don't get your incision in the muscles long enough it doesn't matter so much because they will stretch and give, in about the right direction, but the skin won't,—the incision through the uterus should be ample. It is better to have it an inch or two too long than to have it tear. The incision should be made, when possible, down on the fetus, over the greater curcature of the uterus, and it is well to make it cautiously and divide the coats of the uterus carefully, just down to the membrane, if it is at all possible. Of course, when working in the field, a good many times you are working by lantern light, or by an automobile light, and not with the best help in the world and you have to make it snappy. You have to pack in some sacks, cotton or gauze to keep in the intestines. We use cotton inside flour sacks quite often. Just take absorbent cotton, put it inside the flour sacks and pack that well around the uterus. Then when you are actually drawing out the fetus, that will naturally present the uterus to the outside incision, if you can't succeed in getting it outside before you incise it. In a good many cases we can. It depends on how things lie and somewhat on the size of the calf.

A good many times we get such cases, as I said before, after someone else, the farmer usually, has applied traction until he has caused paralysis of the cow or heifer; that is, it may be just temporary or it may be permanent. If the nerve is just numbed, the animal will be able to get up in a few hours. If it is crushed to any great extent they will never get up.

The question is asked, when we are called to deliver in a case of that kind, and we find that it isn't practical to do an embryotomy, "Will the cow get up then you are through?" We don't

know that. I have operated several of those cases, where they made a nice recovery, healed up all right and got on their feet in good shape and were apparently all right in every way, but never got well, because the nerve had already been damaged to such an extent that it was irreparable. We always figure to operate those cases and take a chance. We have had a few of them that did get up in a few days; usually if they are not up within eight or nine days, they won't recover. They may live along quite a while and struggle around and eat, but they won't make a permanent recovery. However, even if you are going to handle those cases and relieve them, it is usually the simpler matter to do cesarian section.

The instruments that are necessary in an operation of this kind are two, good-sized scalpels, a pair of curved shears, several artery forceps, some medium-sized catgut, some fine catgut, and unless you use a removable buried suture, a figure-eight or triple-loop suture, you had better have heavy catgut for the muscles, although they don't need much sewing. They come back into place pretty well after the operation unless they have been torn, and a few stitches will hold them together in nice shape.

It is important to close the outside wound nicely, with some heavy suture. We prefer linen suture, the ordinary white linen that we buy of Sharp and Smith—I forget the size of it. We make about a four- to six-ply suture of that, and put in, probably every two or three inches, an interrupted suture, and then we suture the lips of the wound together with a continuous suture, and after we get the edges of the wound approximated, we tie the interrupted sutures just moderately tight, so there won't be very much pressure on them. After the operation the intra-abdominal pressure is not very strong. The relaxed condition of the abdominal wall allows the tissues to settle back in shape, and if we put in these interrupted sutures, just to hold the parts together nicely, putting them through the skin and muscles, like doing transverse incision, way down to and on through the peritoneum, then it is well to include the muscles, the peritoneum and the skin.

Of course, to do that you start the suture in the skin, carry it over to the opposite side, run it through the muscle into the opposite side and keep working that way, until you get to the peritoneum and come back and tie it. In that way you have a buried suture that pulls all the structures together and when

ever you want to take it out, snip it on one side of the knot and remove it.

I believe that is a better way of suturing than to suture the muscles and skin separately, in a transverse incision, but where you follow the direction of the fibers in the external and internal oblique muscles, I believe the muscles then should be sutured separately with catgut; just a few sutures in each one, right over the central portion of the wound, will take care of them nicely, but they should be sutured separately and then the skin should have the two kinds of sutures, interrupted and the overcast, bringing the edges together and the interrupted to take care of the tension.

If the calf is delivered alive, you usually have to hand-feed it or put it on a nurse cow for a few days. For a few days there is a little reaction; the dam does not feel very well. Sometimes it is only a day or so, and sometimes two or three days, and in about a week increase their milk flow and if everything goes favorably, it is just a question of a little time until they are on a good flow of milk.

I think that is about all I will say relative to the operation now, and tomorrow I will be glad to go into it further. (Applause).

Dr. Bemis: Mr. Chairman and Gentlemen: I have been very much interested in this discussion of cesarian section in the cow. I think it is an operation that we should do more frequently.

I am not one of those who think that every case of dystocia can be delivered in one way or another through the genital tract. I believe there are conditions which cannot be relieved by any method of embryotomy, because there are certain presentations and certain conditions which have occurred after dystocia takes place, which I believe may make it impossible to deliver certain cases. I think that we should educate ourselves to try to determine what constitutes impossible delivery, so that we may resort to cesarian section more promptly. I believe that is one of the great secrets of the success of the operation.

Dr. Ferguson has described the handling of the animal and the operation. There are a few points which I do a little differently that you might be interested in hearing about. The anesthesia: as you all know, cows are quite susceptible to the action of chloral, and we have been using chloral hydrate in one- and two-ounce doses in warm water. I think that is very

essential. Dissolve the chloral in water which is as warm as you can possibly administer it without injuring the tissues. After using chloral in this way, you will find that the action is much more reliable and comes much earlier than when administered in cold water.

Then the use of the local anesthetic: I am a great believer in placing the local anesthetic *in* the skin; that is, *not* subcutaneously but intradermally or intracutaneously, into the deeper layers of the skin, where it acts immediately. You can begin operating as soon as you have finished the injection of the anesthetic fluid, whereas the diffusion method in the subcutaneous tissue requires some time for the action to take place, and is not as efficient in its action as the cutaneous injection. The muscles will not be sensitive except where the incision crosses nerve trunks or vessels. These points can be injected later, as you go along. Then the next sensitive structure will be the parietal peritoneum which can be injected fairly accurately from the surface, placing the needle in deeply, or it can be injected after it has been exposed. The visceral peritoneum is not sensitive.

I like very much what Dr. Ferguson said about the size of the skin incision. I do not believe in sparing the tissues by incision, because I think it is much more important to have a clean-cut, liberal incision through which one can do the work later, with much less injury to tissues, than would be done by trying to get along with an incision of shorter length.

In regard to the muscles I usually incise also the external oblique. Dr. Ferguson prefers not to incise it, which is all right, but I incise it because, as he says, it passes downward and backward, crossing the direction of the skin incision, and if you split it in the direction of the fibers, then you will have wound edges which must be retracted during the operation, so I incise the external oblique muscle and allow the edges to retract. (It is relatively thin.) That exposes the internal oblique which passes downward and forward, is heavier than the external oblique, and which I either incise or divide in the direction of the fibers, depending upon how much room I am needing in the operating field. I again would rather divide the internal oblique than to have it cramp me in removing the fetus. The transverse muscle of the abdomen in this region is the next muscle in order. It is thin, almost entirely aponeurotic in the upper part, and its direction is practically from above to below,

so that it can be readily divided in the direction of the fibers without cramping the operation.

If the animal is fat, one will find next underlying the transverse muscle of the abdomen, a layer of extraperitoneal fat. If it is abundant, I think it should be carefully dissected out; otherwise it will pouch out into the operative wound and make suturing rather more difficult. Then the peritoneum is picked up and incised, of course, in the direction of the skin incision, making it extend well upward but stopping somewhat short of the length of the skin incision below, so that there will be less danger of wound secretion migrating into the peritoneum from the lower commissure of the wound. This exposes the uterus which is usually right up against the internal wall, which is then incised in the same direction, after being brought up and thoroughly packed around, as Dr. Ferguson has explained. As you all know, a very important thing is to prevent the contamination of the peritoneal cavity by fluids which may escape. It is possible to clamp the peritoneum to the wound edges on either side, or to bring it out of the wound partially or wholly.

The removal of the fetus is a difficult thing. It is heavy, large, often dry and perhaps mal-formed, and one has to plan very carefully to be able to get into the uterus and to lift the fetus up from its position through the incision, if he is working alone, at the same time trying to plan in every way possible to contaminate himself the least, so that he will be in the best condition for handling the uterus and the peritoneum after removal of the fetus.

Now, for the suture which is placed in the uterus, I use a no. 4, ten-day, pyoktanin catgut. I have found this to be very satisfactory because it is strong, comes in good lengths, twenty-eight-inch lengths in dry packages. You can have as many of them ready as you wish, and they can be opened and used as you need them. You don't need to expose a lot of sutures that you are not going to use. Open them as you need them, placing this dry catgut, which you know is thoroughly sterilized, in an antiseptic solution for a few minutes, just long enough so it will get the coils and kinks out of it, but not long enough so it will macerate and get hard to tie.

This is used in the usual form of bowel suture, a continuous Lembert suture, and I usually use the chain stitch at the same time, turning in a liberal amount of the surface of the uterus, at least an inch and a half, because you have a large organ,

and I always think that the more of the surface that you can get together, the greater the chances of prompt cohesion healing. One or two lines of suture in the uterus, I think, are sufficient.

Suturing the parietal peritoneum: I always practice pulling the cut edges up together, out toward me. The parietal peritoneum lines the abdominal cavity. The cut edges will be free here in the wound edges. I bring them out between the edges of the muscles, toward me. Then, with the same kind of catgut suture as mentioned above, pass the needle through the transverse muscle of the abdomen, through one edge of the peritoneum, across through the other edge, which is pulled out between the muscle edges, and into the opposite muscle edge. In this way, the parietal peritoneum is brought up so the surfaces are together, and it is anchored to the transverse muscle of the abdomen, making a smooth peritoneal surface to which internal organs are not apt to adhere.

Then the suturing of the muscles, internal oblique and external oblique, depends upon the kind of apposition you are getting. I either place a few sutures in the internal oblique, catgut sutures, and then another line in the external oblique, or make one line of suture do for both. My object is to eliminate wound spaces. I don't want any spaces within the wound itself, into which secretions will gather, and then, if there is any infection, you have a ready source of an abscess in the wall.

The skin is sutured separately, or sometimes I suture it with the external oblique muscle, using sterile silk suture, either of continuous chain stitch, or I like very much to use an X-shaped suture.

The wound surfaces are then covered with collodion, or if you don't have that in your equipment, cover the line of suture with pine tar or pure creolin, with a thin film of cotton, and either of those will stay on for several days and protect the healing surfaces, leaving, of course, a little area for drainage, unsutured at the lower commissure of the wound.

Dr. W. W. Williams: Mr. Chairman: In the closing of the large skin sutures I have used a little bit different technique from that outlined by the previous speakers. In the first place, a drainage tube is passed underneath the muscles, which are then coapted with interrupted sutures, eliminating as far as possible the dead space underlying the skin. Often the passing of a few sutures through the margins of the superficial fascia

serves to bring these margins together over the muscle, and aids materially in eliminating any dead space.

Then, in apposing the skin, I have employed a square suture, using a one-quarter-inch linen tape. It is passed inwardly through one margin and out through the opposite margin, then reversed, passing it back in the opposite direction, through the second margin, being directed inwardly about one-half to three-quarters of an inch from the point where it previously penetrated that margin, and then out through the first margin. Here the knot is tied, the margins being turned outward so that the subcutaneous tissue is apposed.

The entire wound can thus be closed permanently, since, with a drainage tube securely in position to take care of any discharges, a firm coaptation usually occurs very readily with little danger of any of the sutures pulling or sloughing out.

DR. L. A. PAQUIN: I would like to ask Dr. Ferguson about the removal of the placenta.

DR. FERGUSON: If it is possible to remove it, if it is in shape to be removed, the best thing is to loosen it up as far as you can reach from the incision in the uterus and then afterwards remove it through the os in the natural way.

I have noted this: in a good many cases the placenta is too adherent to remove. Just dust some boracic acid and iodoform in the uterus. We use this powder freely, and use boracic acid about eighty or ninety per cent and enough iodoform to make a hundred per cent. Mix these and dust it or get it in there, before you suture up the uterus.

We have found that placentas, that looked as if they wouldn't come away themselves after operating, would pass away in twenty-four hours. The reason we use the antiseptic powder is to make a cleaner field, and to prevent putrefaction.

The first thing we do in these cases is to make an examination, clean them up, and tie the tail out of the way. Give the external parts a good, thorough cleaning, and if the cow has been handled by the owner or anyone else, we usually give the vagina a careful washing out and we can disinfect the external parts as well as we can, and have everything clean. Then we clean up our hands and arms, and usually use a little mineral oil or sterile lard, anything that is at hand that is a good lubricant. Camphorated oil is all right. We lubricate the hand and arm and go in and make an examination. We try to be pretty particular about handling everything in a cleanly way, so as not to get

any more infection in the uterus or vagina than is already there, and if there is any, we try to remove it before we operate. That holds true, of course, in all obstetrical work; you probably all do about the same thing.

If you were to get a case of bad os, an os that couldn't be handled except by an operation, possibly through the vagina, and you decided on cesarian section, of course, when you cut down on to the fetus it would be surrounded by fluids of the uterus, and the thing to do is to make a careful incision through the walls of the uterus, that is, after it is presented to the external wound, and then drain off the fluid with a piece of stomach-tube, or siphon it off as much as you can. You don't want that big volume of fluid to go into the abdominal cavity, and it will be almost impossible to keep it out if you don't exercise care.

Dr. Bemis brought out a good point in delivering the calf. A good many times you cut right down on to the breach of the calf and the hind limbs are flexed at the hocks. It may be that you have to correct the calf's position before you can deliver it. Now, if it is a live calf, that usually isn't so difficult, and it isn't always so easy. You don't want to cut off the legs, if you can possibly avoid it, because if you are trying to deliver it alive, you have to correct the position of that calf even after you have cut down on to it, so you want to figure on that. If you cut down onto a breech presentation, if that is the part that is presented, you must have some suitable ropes at hand, so that you can, after straightening out the legs, half-hitch a rope around the hocks. We always carry a tackle block, so we can attach it to the ceiling and make the traction conform with the incision and the incision in the uterus. In delivering them in this way, have your traction so it will not do any unnecessary dragging or tearing. It is not always possible to get it exactly right, but as near as you can.

In the majority of the cases the placenta hasn't given the trouble that we were afraid it would. If the case has gone to the point where the young is emphysematous, the placenta is usually destroyed, and a very small percentage of those cases recover. As far as the placenta is concerned, it is usually more or less gangrenous, and it comes away readily. In the other class of cases, I have found what I have just outlined to be the best way to handle them.

Dr. W. L. Williams: Mr. Chairman and Gentlemen: I have been quite interested in this discussion. There are some im-

portant points that I would like to have brought out a little more clearly.

In veterinary science we have two elements to consider: first, the scientific side, our ability to perform cesarian section; and second, the economic side, what is it worth to the owner? This latter side has not been touched upon by any one of the speakers thus far.

Dr. Ferguson spoke of cases of cesarian section being called for when the pelvis is too small to permit of delivery. In human obstretrics this is occasionally found satisfactory, and women have given birth to a considerable family of children by means of the cesarian section. But in veterinary practice, we cannot undertake to grow animals as an economic proposition by cesarian section, so the question that has occurred to me is this: In these cases where you have the best opportunity, where the calf is alive and there is no material degree of infection, but the pelvis is too small to permit the birth at this time, as in the young heifer that Dr. Ferguson mentioned, and he performs a successful operation, conserving the lives of both the mother and young, is the mother valuable thereafter as a breeding animal? Will the pelvis grow sufficiently in time, so she may properly calve afterwards?

If that is not true, then the question arises: Is she worth the expense of the operation for beef? In some cases that is certainly true, but the question is: Where shall the line be drawn? In the majority of our dairy animals, it is scarcely worth while subjecting a cow to such an operation as this upon economic grounds, because by the time that we get recovery, her beef value is not sufficient to justify the operation. In some cases the operation may be justified because of the value of the calf. If, however, the cow is useful for future breeding purposes, then the operation has a very distinct value to us.

On the other hand, we have those cases mentioned, where the fetus is dead and putrefied, and where, as I understand, Dr. Ferguson, the proportion of recoveries is very, very low, and the economics of the operation are open to debate in the beginning.

In torsion of the uterus, I would like to ask Dr. Ferguson just what benefit it is. Do those animals with torsion of the uterus, after cesarian section, ever breed again? Those which I have seen, which could not be delivered by the natural passages, could never have bred again, because the torsion and the

adhesions were of such extent that the uterus could not be readjusted and, consequently, I could see no economic value to the operation. It might have a great scientific interest in that we might have the cow recover after a long period of time, but she would not be worth the trouble.

There is another question that comes up in human obstetrics which I think it would be just to ask here, and that is regarding the safety of future parturition, or whether the cicatrix will cause a rupture of the uterus. In woman there is a question of whether there is a proper pregnancy. Will the presence of the cicatrix cause a rupture of the uterus in the next child-birth? I would like to know if there is any experience along that line.

DR. FERGUSON: I couldn't say whether there is any danger of that in the cow or not. I know of cows that have bred after cesarian section and delivered their calves normally, and I presume that they were all right. I think that repair in the uterus is usually very good. I think that when you get union it straightens out and makes a pretty good job. Of course, it leaves a scar, but as far as I know, it doesn't make any difference. I couldn't answer that question completely.

DR. BEMIS: I think I should hardly make a statement on this, because I am in the same situation that Dr. Ferguson is. I can't answer definitely. We don't have enough of these cases; we don't have an opportunity to follow them up when we do have them.

My impression is that the breeding efficiency of the cow, after such an operation, would depend more upon the infection and complications due to infection than it would upon the operation itself. I feel quite sure that as far as the scar, the cicatrix in the uterus, is concerned, that the cow would and should breed, and I feel that there would be very little, if any, danger of rupture of the uterus at the time of next parturition.

The point which Dr. Williams makes in regard to the economics of it, of course, we all realize. However, I feel that if these operations can be done, if there is any reason at all for us to think that an animal might live through the operation, even though there might be a chance of her not breeding afterwards, or possibly not being worth the price of the operation for beef, from the standpoint of scientific accomplishment and reputation of the veterinary profession, I think the operation would be worth while, even though the operator was not able to collect a fee which might compensate him fully for the operation. I think

we should go into these operations in which it is at all reasonable to expect that we are proceeding in the right direction. I would rather do an operation of this kind, if I can do it successfully, even if I don't get any pay at all. I believe it would be worth it to the profession, and to my own standing in the community, and I would get it back many times over in some other way. (Applause.)

DR. FERGUSON: I just want to say a word relative to the operation as it is done in the field. Of course, where you save the cow and the calf for the man he is usually well pleased, and my clients have taken to the operation first rate; even where there has been a loss, they have understood that it was practically just giving the animal one more chance.

I have operated lots of cases that, in my opinion, didn't have much of a chance, but I saw that the owner wanted to do something more, and I didn't propose to work around four or five hours on a case of that kind when I could perform an operation in a much shorter space of time, and do it more easily with a lot less inconvenience to the animal, and it has helped a good many times in that way. You have probably all had considerable experience in going out to complicated cases and spent a good deal of time on them. We have all done embryotomy. I used to think it was my duty to stay with the case until I had delivered the goods, and a great many times you would earn more money than the animal was worth, and you would not get laborer's wages for the time you put in. You couldn't charge it. It wouldn't be good business to do it, and this simplifies those cases. If you handle your client in the right way, he appreciates that you are doing the best possible, and he is taking a chance on it.

DR. A. L. DANFORTH: I would like to ask Dr. Ferguson, for the information of the men present, if he has any data as to how many of these operations he has done and what the percentage of recovery is.

DR. FERGUSON: I would have to take my memory for that. I haven't data of that kind with me. I have probably done, in the last ten years, in my own practice and for other veterinarians, forty or fifty cesarian sections, and, out of that number, there were probably fifty per cent of them that were suitable cases and made recoveries. We got right around one hundred per cent recoveries in cases like the one I described at first, cases where the maternal pelvis was too small to make a delivery either by

traction or too small to permit a decent embryotomy.

CHAIRMAN KINGMAN: These speakers have skilfully evaded the question: What did you say to that owner when he asked you how much it would cost him? That is what we have been trying to find out.

DR. FERGUSON: It is like every other operation in veterinary work. You have to go according to circumstances. If you are operating for a rich man on a pure-bred cow and although he understands it is a last resort operation, you want to charge him all that it is reasonably worth, all that a veterinarian would charge for an operation of that kind, win or lose.

If you are operating for a client and he understands it is a last resort operation and he wants it done, you have to charge him for doing it. You don't want to be too high in a case of that kind, because you are getting a lot of benefit. You don't have to strip off and work two or three hours on a job where you have to take the chances of infection. You are saving your own anatomy when you are doing this job. It is not as hard as a bad case of embryotomy, and less painful to the cow. I have always got paid satisfactorily for them. Ordinarily, if it is right around home, these cases that come out favorably, I get twenty-five to thirty dollars for them, for there wasn't very much expense to the dressing materials, etc., because you can get most all of the dressing material except the sutures and the anesthetic right at the place. You can sterilize it yourself, while you are getting the animal ready. You can, in an operation of that kind, use ten or fifteen dollars' worth of gauze and packing material if you want to, but if you go at it from a business point of view, and make the client furnish pillow-cases or sheets or flour sacks, to do the packing with, you can get by economically so far as the actual cost to yourself is concerned, and you will get paid for your time; and generally there is something about this operation, even if you are doing it as a last resort operation, that makes the fellow you are doing it for, even if he hasn't paid you for a long time, go in and dig up for this operation. It looks good to him.

CHAIRMAN KINGMAN: I believe that we will have to bring this discussion to a close, unless someone has something that is very urgent that he would like to ask.

We will now listen to a paper by Dr. W. W. Williams, of Springfield, Massachusetts, on "Cervical Surgery."

Dr. Williams presented his prepared paper, illustrating it with slides. (Applause.) (Paper and discussion published in the JOURNAL, February, 1924.)

The meeting adjourned at 12:30 p.m.

ADJOURNMENT

FRIDAY MORNING SESSION

August 30, 1923

(Section on General Practice)

The meeting convened at 9:30 a.m., Chairman H. E. Kingman presiding.

CHAIRMAN KINGMAN: The first paper on our program this morning is one by Dr. W. W. Dimock, on "Sterility in Mares." Dr. Dimock. (Applause.)

Dr. Dimock read his prepared paper. (Applause.) Paper and discussion published in this issue, p. 141.

CHAIRMAN KINGMAN: The next paper is an illustrated paper, by Dr. Edward A. Cahill, on "Post Vaccination Trouble." (Applause.)

Dr. Cahill presented his prepared paper. (Applause.) Paper and discussion published in JOURNAL, November, 1923.

CHAIRMAN KINGMAN: The next paper is on "Anesthesia, General and Local," by Drs. H. E. Bemis, W. F. Guard and C. H. Covault. (Applause.)

Dr. Bemis read the paper. Published in the JOURNAL, January, 1924.

CHAIRMAN KINGMAN: The paper on "Mastitis: Its Etiology and Pathology," by Dr. G. E. Jorgenson, I will read by title, so that it may become a part of the record; also a paper on "Practical Observations on Some Common Diseases of the Dog and Other Laboratory Animals," by Dr. J. G. Hardenbergh of Rochester, Minnesota. (The paper by Dr. Jorgenson was published in the JOURNAL, March, 1924. The paper by Dr. Hardenbergh, November, 1923.)

I will now declare nominations in order for Chairman of the Section on General Practice for next year.

DR. FERGUSON: Mr. Chairman, it has been our custom in this Section, ever since the Section was started, to elect the Secretary as President for the ensuing year. I therefore take pleasure in nominating our Secretary, Dr. Caldwell, who has served us well this year as Secretary, to act as Chairman of this Section. I move that the rules be suspended and the Chairman

instructed to cast the unanimous vote for Dr. Caldwell. (Applause.)

The motion was seconded and unanimously carried.

CHAIRMAN KINGMAN: Dr. Caldwell is elected. The next in order is nomination for a Secretary.

DR. W. L. WILLIAMS: Mr. President, I would like to place in nomination a veterinary practitioner who has done a great deal for the advancement of veterinary practice in the United States, Dr. E. R. Steel, of Iowa. (Applause.)

DR. W. W. WILLIAMS: I move that the nominations be closed and that the Secretary cast the unanimous ballot for Dr. Steel.

The motion was seconded and carried. The Secretary cast the ballot, and Dr. Steel was declared elected Secretary of the Section for the ensuing year.

The meeting adjourned at 12:30.

ADJOURNMENT

REPORT OF THE CLINIC

Since this part of the program was not recorded by a stenographer, it is only fair to the operators that they should be given credit for their splendid demonstrations. Further, the clinic should be reported because of the interest shown in it by those in attendance.

For a number of years past, the A. V. M. A. has made no attempt to conduct a clinic. There are a number of reasons that served to discourage any attempts to put on such a demonstration. In the first place, it is hard to find quarters where the operator may perform an operation that is a credit to himself and the profession, and still make it of any value to his audience.

The persistence in attempting to demonstrate an operation that can be observed only by a few, and which must be done under very adverse circumstances, will again bring into disfavor the idea of holding clinics before the A. V. M. A. Another factor that is hard to overcome is to avoid the loss of time for preparation and the overlapping of one demonstration on the time alloted to another. As a result of the difficulties encountered in holding clinics, the idea was abandoned and the program was given over to laboratory subjects and topics of little interest to the practitioner.

Two years ago, largely through the efforts of Dr. A. T. Kinsley, an attempt was made to regain the interest and support of the

man in the field of practice. If the A. V. M. A. clinic is to "come back," the officers and local committees must be careful in selecting subjects, and in giving them the proper time, thought and preparation. It is up to the practitioner to say whether or not these clinics are of sufficient importance to warrant the time and trouble it takes to prepare them.

There can be no doubt relative to the interest shown in the clinics of the last two years, and it is to be hoped that better ones will be held in the future. Allow me to repeat, however, that if the clinical program is to succeed, all demonstrations must begin and finish within certain limits. If this cannot be done then the demonstrator has attempted something inappropriate for the occasion or else has not made proper preparation.

A clinic places the profession under trial. Observers from foreign countries are present, as well as representatives of the live stock industry, and members of the profession of human surgery and medicine. So that, whatever is attempted, before such an audience, must be of the highest possible degree of proficiency that the demonstrator can attain, or else he will bring discredit upon himself and the profession.

The local committee at Montreal deserves an immense amount of credit for the work it did in preparation for the clinic. It intended to hold separate clinics for the large and small animal departments but arrangements were not completed for the small animal department, so the two were thrown into one group. While this resulted in more or less confusion, it filled the clinical program and resulted in a very creditable demonstration.

Two factors stand out as high lights, indicating the progress of the veterinary profession. They are the perfection of methods of asepsis and of anesthesia. I do not mean to infer that asepsis and anesthesia are new to surgery, for we have had the example and technique before our eyes in human surgery for many years, but it seems to have been difficult to apply these things to the field of veterinary surgery, and still remain within the limits of practicability.

I am sorry to admit that veterinary surgeons have been inclined to be more proficient in restraint than in the administration of an anesthetic, and to depend upon disinfection and the resistance of the patient instead of improving their technique in asepsis. It has been stated that "Skill is the flower that blooms on the rough stalk of routine." A surgeon may be judged by his ability to adopt and maintain cleanliness. The degree to which

he succeeds depends upon his training. Training constitutes the difference between the professional and the layman.

So, while the operators before the Montreal clinic worked under adverse circumstances in many ways, the demonstration was a success and we may, without reservation, report progress in surgery. The operation which probably attracted the most attention was the cesarian section in the cow by Dr. Ferguson. His technique and discussion is published as part of the proceedings of the Section on General Practice.

Dr. Ferguson demonstrated his remarks by the operation, proving that he can practice what he preaches. The calf was delivered alive and the mother was recovering nicely, according to the last report. The anesthesia was given by Dr. H. E. Bemis. Chloral was given by the mouth and the field was blocked by local anesthesia. The technique of Dr. Bemis also appears in the proceedings of the Section on General Practice.

In spite of the enormous incision, the animal gave no evidence of pain. No greater contribution could be made to veterinary surgery than a practical method of anesthesia, and we are proud of the public demonstration, and wish to make it a matter of record. Sterile towels were used to protect the wound which added another important element toward the development of good surgery in veterinary practice.

Dr. J. F. DeVine "made good" in determining the age of a fetus. In a cow that had been pregnant for twelve weeks he missed it by three days. This demonstration was received with a great deal of interest and drew the appreciation of the audience as evidenced by the applause. Dr. DeVine gave a lecture on sterility, using specimens to demonstrate his remarks.

Dr. Embree gave a lecture on the causes of death in animals shipped to market to be slaughtered. His paper was illustrated by moving pictures and was of great educational value.

The time between operations was consumed in discussing numerous cases that were presented. Many of them represented the everyday problems of the practitioner. Drs. Etienne and Etienne were always "on the job" and made the clinic a continuous performance and a credit to themselves and the Association.

H. E. KINGMAN, *Chairman.*

Fifty-five thousand post office and treasury buildings, all over the United States, recently displayed posters telling the public that "Meat is wholesome."

OTHER MEETINGS

VETERINARY MEDICAL ASSOCIATION OF NEW YORK CITY

The regular monthly meeting of the Veterinary Medical Association of New York City was called to order by the President, Dr. J. Elliott Crawford, in the Academy of Medicine, 17 West 43rd St., Wednesday evening, December 5, 1923, at 8:30 p.m.

The minutes of the November meeting were read and approved.

Dr. P. A. Fish, of the New York State Veterinary College, Cornell University, Ithaca, N. Y., read a most scientific and interesting paper on "Nutrition Trails." This paper was most carefully prepared and was illustrated by numerous lantern slides. The paper was discussed by Drs. Frank H. Miller, W. Reid Blair, Alexander Slawson, R. W. Gannett, C. S. Chase and others. It will be published in the JOURNAL and will surely be appreciated by all who read it.

Dr. C. S. Chase reported having had peculiar nervous symptoms resembling tetanus develop in six dogs that had been given the anti-rabic vaccine treatment, from three to six weeks previously. Four dogs recovered and two died. Dr. T. E. Smith reported a large number of dogs treated with the anti-rabic vaccine with no bad results. One case showed nausea, while receiving the six-injection treatment, but recovered. Dr. Ticehurst reported a large number of cases treated with no ill effects.

The election of officers resulted as follows: President, Dr. J. Elliott Crawford; Vice-President, Dr. Bruce Blair; Secretary-Treasurer, Dr. C. G. Rohrer. Board of censors: Dr. C. E. Clayton, Chairman; Drs. Geo. J. Gaubeaud, Dr. E. A. Durner, Dr. Alex. Slawson and Dr. Wm. J. McKinney.

The resignation of Dr. E. J. Decker, of Far Rockaway, was accepted with regrets. On motion made and signed by Drs. R. W. Gannett, E. B. Ackerman and W. Reid Blair, Dr. Wm. Sheppard and Dr. E. J. Decker were unanimously elected honorary members of this Association.

For the Legislative Committee, Dr. W. Reid Blair reported progress, and for the Prosecuting Committee, Dr. Corwin reported progress.

A vote of thanks was extended Dr. P. A. Fish for his contribution to the program.

No further business appearing the meeting adjourned.

JANUARY MEETING

The regular monthly meeting of the Veterinary Medical Association of New York City was called to order by the President, Dr. J. Elliott Crawford, in the Academy of Medicine, 17 W. 43rd St., on Wednesday evening, January 2, 1924, at 8:30 p.m. The minutes of the December meeting were read and approved.

Dr. W. Reid Blair gave an illustrated lecture on "The Equines of the New York Zoological Park." Dr. Blair described the various species of zebra, wild horses and asses, giving their origin and history, being greatly assisted by about forty lantern slides showing the many characteristics of the various animals. This talk was unusually interesting and instructive.

Dr. R. W. Gannett reported an unusual case of pyometra in a bitch. Dr. Crawford reported a similar case in a chow bitch.

Dr. Geo. W. Little reported several cases of pseudo-rabies in dogs that had been fed on moldy biscuits, these animals showing trismus of the jaw and atrophy of the temporal muscles.

Drs. Wallace Vail, Wm. Meyer and S. Shapero were elected to membership in the Association.

Dr. Harry Ticehurst invited all present to the New Jersey State Veterinary Medical Association meeting on January 10. A vote of thanks was extended Dr. W. Reid Blair for his interesting contribution to the program.

The President appointed the committees for the year: Program —Drs. R. W. Gannett, Bruce Blair and Alex. Slawson; Legislative—Drs. W. Reid Blair, C. E. Clayton and R. W. McCully; Prosecuting—Drs. O. E. McKim, Spaulding, MacKellar, Corwin and Booth.

No further business appearing, the meeting adjourned.

C. G. ROHRER, *Secretary.*

VETERINARY ASSOCIATION OF HAWAII

On March 22, 1924, sixteen veterinarians gathered at the Pacific Club, Honolulu, Hawaii, for the purpose of organizing a veterinary association for the Territory of Hawaii.

A temporary organization was effected, with the selection of Dr. P. H. Browning, Territorial Veterinarian, Honolulu, as

Chairman, and Dr. J. C. Fitzgerald, Deptuy Territorial Veterinarian, Makawao, Maui, as Secretary.

Dr. Browning addressed the meeting, and in suggesting the desirability of forming a territorial veterinary association, he outlined the benefits that would be derived therefrom. This met with the approval of the veterinarians present, and it was agreed to proceed with the organization of a permanent body.

An election of officers for the year resulted as follows: President, Dr. A. R. Rowatt, Deputy Territorial Veterinarian, Honokoa, Hawaii; Vice-President, Dr. W. T. Monsarrat, Honolulu; Secretary, Dr. H. B. Elliot, Deputy Territorial Veterinarian, Hilo, Hawaii.

The following committee was selected to draw up a constitution and by-laws: Drs. W. T. Monsarrat, P. H. Browning and L. E. Case.

The meeting adjourned at 10:30 p.m., sine die.

H. P. ELLIOT, *Secretary.*

INTER-STATE VETERINARY ASSOCIATION

The Spring meeting of the Inter-State Veterinary Association was held in the Chamber of Commerce club rooms, at Sioux City, Iowa, March 20, 1924, with sixty veterinarians in attendance.

Dr. W. F. Miller, of Storm Lake, Ia., called the meeting to order at 10 a.m., and, after a short business session, addressed the Association on "Topics of General Interest to the Profession." Dr. Miller in his discussion had occasion to refer to the Farm Bureau, and urged the veterinarian to cooperate with that organization and its members wherever possible. Professional ethics as it affects the veterinarian should, according to Dr. Miller, be given further consideration, and revised, if necessary, to meet the requirements of the practitioner of today.

Dr. Chas. Murray, Professor of Veterinary Investigation at the Iowa State College, gave a very comprehensive and complete discussion of "Poultry Diseases." The interest shown in this subject by the members is evidence that the veterinarian is being called more and more to solve the problems of the poultry raiser.

Dr. E. R. Steel, Secretary of the Iowa Veterinary Association, spoke on "The Proposed Policy of the American Veterinary Medical Association," and received several applications for

membership in our National organization, through the effectiveness of his remarks. The proposed policy was then endorsed by the Association.

Dr. Geo. B. Winch, of George, Ia., demonstrated the use of a no. 10 gelatin capsule in enterectomies on small animals. The capsule is placed in the lumen of the intestine after excision of the diseased portion, and Czerney-Lembert sutures are easily applied.

A resolution was presented by Dr. L. U. Shipley, and adopted by the Association, urging, in the interest of the live stock industry, careful consideration of animal power in public utilities, by the various state, county and municipal governments.

A very interesting small animal clinic was held at Dr. G. P. Statter's hospital.

Through the courtesy of the Sioux City Serum Company, Purity Biological Laboratories and the Sioux Falls Serum Company, a banquet was served in the West Hotel, followed by a theater party.

P. L. ELLIS, *Secretary.*

POULTRY DISEASE CONFERENCE

Under the auspices of Rutgers College and the State University of New Jersey, a poultry disease conference for veterinarians was held at New Brunswick, N. J., March 25-26, 1924. This conference, the first of its kind to be held in this section of the country, will probably become an annual event. There were 25 veterinarians from New Jersey and Pennsylvania in attendance. Dean V. A. Moore, of Cornell University, and Dr. Theobald Smith, of the Rockefeller Institute, were present and took part in the discussion.

The program was spread over two days, with morning, afternoon, and evening sessions on the first day, and morning and afternoon sessions on the second. Each subject was handled by an expert in his line. The heavy end of the program was handled by Dr. F. R. Beaudette, Poultry Pathologist, who presented a number of subjects in a most pleasing and capable manner. It is with no disparagement to the others on the program to say that Dr. Beaudette made a hit.

The subjects presented by Dr. Beaudette were as follows:

"Postmortem Technic and the Anatomy of the Fowl."
"Differential Diagnosis of Fowl Cholera and Fowl Typhoid."
"White Diarrhea. Bleeding and Making the Agglutination Test. The Single-Tube Blood Test."

"Differential Diagnosis, Prevention and Treatment of Roup, Canker and Chicken Pox."
"Diagnosis of Poultry Nutritional Diseases."
"Diagnosis of Infectious Entero-Hepatitis and Avian Coccidiosis."
"Round Worms, Tapeworms and Their Sequelae."
"A Discussion of Avian Tuberculosis and Demonstration of Tuberculin Testing."
"Differential Diagnosis of Botulism and Wry Neck. Demonstration of Botulism and Use of Antitoxin."
"Poultry Vaccines and Vaccination Demonstration."

Professor W. C. Thompson, Poultry Husbandman, addressed the conference on the following subjects:

"The Importance of the Poultry Industry in the United States."
"Caponizing Demonstration and Notes."
"Environmental Conditions as Predisposing Factors to Common Poultry Diseases."

Other subjects presented were as follows:

"A Poultry Feeding Program Conducive to Health," by Professor N. P. Mehrhof.
"The Future of the Poultry Industry," by Professor Henry Keller.
"The Habits of Poultry Lice and Mites," by Professor T. J. Headlee.
"Demonstration of the Sodium Fluorid Method of Treatment," by F. G. Clickner.
"Non-Specific Factors which Produce Losses in Baby Chick Flocks," by W. H. Allen.
"The Trend of the Veterinary Profession," by Dr. J. H. McNeil, State Veterinarian of New Jersey.

The program was concluded with a round-table discussion of poultry diseases.

VICTOR G. KIMBALL, *Reporter.*

PHILADELPHIA VETERINARY CLUB

The monthly meeting of the Philadelphia Veterinary Club was held at the Veterinary School, University of Pennsylvania, on March 27, 1924, at 8 p.m. The meeting was called to order by the Chairman, Dr. R. M. Staley. There was a large attendance

The following men addressed the meeting: Drs. T. E. Munce, C. J. Marshall, L. A. Klein, and S. H. Gilliland.

Dr. Munce gave us the data on the recent outbreak of foot-and-mouth disease in California; also the precautions that were being taken to keep it out of Pennsylvania and the preparations they were making to fight it, in the event it did get in. All the veterinarians assured Dr. Munce of their entire support if needed.

Dr. Marshall spoke on the various outbreaks of foot-and-mouth disease in this country since 1872, and had a chart showing the number of herds affected, the number of animals killed and the appraised valuation of those killed in each outbreak.

Dr. Marshall also had a chart, and talked on the foot-and-mouth disease in Great Britain. There was an outbreak there for forty-seven years at one time, which outbreak ran up to 1886, and it has been there ever since at different times. The last few years it has been very bad. It seems they do not use the same methods there to stamp it out, that we do. Dr. Marshall feels that this is the reason why they have it there almost all the time.

C. S. ROCKWELL, *Secretary.*

NATIONAL ASSOCIATION OF B. A. I. VETERINARIANS —MISSISSIPPI VALLEY DIVISION

The regular meeting of the Mississippi Valley Division was held at East St. Louis, Ill., April 5, 1924. The meeting was called to order by the Secretary, Dr. G. H. Bruns. Owing to the absence of the President, Dr. L. C. Stewart, who was called to California on foot-and-mouth disease, Dr. R. C. Lambert was elected temporary Chairman. The minutes of the previous meeting were read and accepted.

Dr. M. L. Crans read a paper on "Tuberculosis," which was followed by a discussion by Drs. Jenison, Bruns, Timmerman, Crans, Lambert and Joss. Owing to the great value of the paper submitted by Dr. Crans, it was moved and seconded that the Secretary have copies of the same printed and distributed to each member.

The following members were present: Drs. G. H. Bruns, M. L. Crans, E. A. Garleb, J. S. Jenison, J. W. Joss, R. C. Lambert, F. S. Thurmon and H. J. Timmerman.

The meeting adjourned to meet again, May 3, 1924, at St. Louis, Mo.

G. H. BRUNS, *Secretary.*

MICHIGAN CAPITOL VETERINARY MEDICAL ASSOCIATION

The second meeting of the Michigan Capitol Veterinary Medical Association held this year convened in the State Office Building, Lansing, Mich., Wednesday, April 2, 1924. The meeting was called to order by the President, Dr. L. A. Wileden, of Mason, at 3:00 p.m. Following the usual business session, the following program was presented:

"The Principal Points in Building a Successful Practice," by Dr. W. W. Thorburn, Lansing.

"Phases of Investigational Work on Control of Parasites," (illustrated by lantern slides) by Dr. W. L. Chandler, Michigan Agricultural College, East Lansing.
"Taking the Problem of Parasite Control to the Farmer," by Dr. George McCollister, Kalmazoo.
"The Dog as a Patient," by Dr. E. K. Sales, Michigan Agricultural College, East Lansing.
"Some Interesting Case Reports," by Dr. A. E. George, Perry.
"Vitamin and Mineral Deficiencies," by Dr. S. R. Johnson, Lansing.

At 6:30 we all went to the Green Lantern Tea Room and enjoyed a feed that was fit for a king. Following the dinner, we listened to two very interesting papers, and finished the evening with a round-table discussion, during which some mighty valuable suggestions were made and discussed.

All papers were well received, and especially those of Drs. Thorburn and George. It is a difficult task for a practitioner to lecture before a body of this kind, owing to the fact that his business is to practice and not so much to preach. While all did well, the above should be given special credit.

About forty attended the meeting, thirty-four remaining for the dinner.

A. E. ERICKSON, *Secretary.*

MAINE VETERINARY MEDICAL ASSOCIATION

On April 14, 1924, at 6:15 p.m., the members of the Maine Veterinary Medical Association were supper guests of the Waterville Kiwanis Club, at the Elmwood Hotel, Waterville, Maine. Dr. P. R. Baird, Secretary of the Maine Veterinary Medical Association, introduced the veterinarians and also led in directing the musical program, as he is a prominent member of the local Kiwanis.

A very enjoyable hour was passed in partaking of the delicious meal and listening to the various speakers, after which the regular veterinary meeting opened.

Dr. C. F. Davis gave a very interesting talk on his successful treatment of several stubborn cases of diarrhea in horses; these cases responded to bacterin treatment.

Dr. C. F. Dwinal handled the subject of azoturia very skillfully and mentioned several treatments that had been found effective, together with some treatments that proved ineffectual.

Dr. Harry W. Jakeman, of Boston, Mass., a visitor at the meeting, spoke earnestly on the value of the practicing veterinarian getting into the poultry game, stating that more money was invested in poultry than in hogs and unless the veterinarians

took the lead in solving the poultry disease situation, other agencies might take their place.

Dr. P. R. Baird described an interesting account of a cattle case he recently encountered. The animals, when turned out in the yard, showed a depraved appetite for the wooden fence, although the ration of the animals was properly balanced. A general discussion of this case was indulged in.

Dr. A. Joly entertained the meeting with an account of his recent trip to Cuba, Florida and the South. It seems that the master of the vessel on which Dr. Joly sailed had not provided a physician, and when several sick patients were reported, Dr. Joly was drafted into service, after being tempted by a little "oil of joy." Many funny situations presented themselves with Dr. Joly, Veterinarian, acting as chief physician on the good ship "Cuba."

Dr. C. L. Ryan, Vice-President, presided at this most interesting meeting and a good attendance was noted.

J. B. Reidy, *Res. Sec. for Maine.*

COMMUNICATION

CALIFORNIA IS FULL

To the Editor:

We have never encouraged reciprocity out here (California), for the reason we have no locations open. It is estimated that there are over one thousand veterinarians here now who are in other lines of business than veterinary practice. It would seem that every veterinarian east of the Rockies who could scrape up the railroad fare or get gasoline for the flivver has come to California. No wonder they report a shortage of veterinarians in the East. If they will look around they will find them all out in California, enjoying our climate and good roads. They would rather sacrifice their veterinary careers than return and face the physical discomforts of the East. Please publish this statement, as what to do with the veterinarians out here has become a real problem.

J. L. Tyler.

Huntington Park, Cal., March 24, 192'.

(The above is a reply to a questionnaire sent the secretaries of all veterinary examining boards, asking for information on the subject of reciprocity. —Editor.)

THE BRIDLE TRAIL CALLS

Under the above title, Secretary Dinsmore, of the Horse Association of America, has prepared a very attractively illustrated brochure (no. 108), a copy of which has been sent to the following:

The managing editors of 300 principal newspapers.
The sporting editors of 62 principal newspapers.
All cartoonists of note.
The editors of all leading agricultural papers.
Columnists of principal metropolitan dailies.
Principal authors of leading magazines.
Washington correspondents of leading newspapers.
President Coolidge, cabinet officers, all senators and representatives at Washington.
More than 8000 business men in Chicago and suburbs whose incomes are known to be sufficient to permit them to own and use saddle horses.

In the letter accompanying the brochure, Mr. Dinsmore writes as follows:

"Horseback riding promotes health, prolongs life, and increases one's ability to command and enjoy its pleasures. Riding well-bred, spirited horses gives a sense of controlled power and ability to overcome all obstacles—a feeling that one has the power to master Fate—that comes from no other exercise or recreation. Horses, like men, have that intangible something we call personality and, in ways our finite minds cannot comprehend, riders gain something far beyond mere exercise or fresh air."

NEWS NOTES

A considerable increase in the number of cases of rabies is reported from Philadelphia.

More than five per cent of the hogs in Pennsylvania were immunized against cholera last year.

There were 405,804 dogs licensed in Pennsylvania during 1923. Licenses were issued to 1863 kennels.

A hog cholera vaccination school was held at Anamosa, Iowa, April 9-10, 1924, under the direction of Dr. J. S. Craft, of Iowa State College.

Two children were recently attacked by a cat, believed to be rabid, in Sioux City, Iowa, and are now undergoing the Pasteur treatment.

Farmers in the vicinity of Elma, Iowa, have been suffering heavy losses from fowl cholera.

Blackleg has appeared on a number of farms in the vicinity of Sibley, Iowa, according to press reports.

NECROLOGY

DILLON CORISTINE

Dr. Dillon Coristine died suddenly, December 9, 1923, at Osoyoos, B. C. He had been in poor health for several years, but had been able to perform his official duties up until the time of his death.

Born in Lambton County, Ontario, July 3, 1870, Dr. Coristine received his veterinary training at the Ontario Veterinary College, having been graduated with the class of 1895. Immediately thereafter he joined the Royal Northwest Mounted Police, as Veterinary Staff Sergeant, in the Northwest Territory. In 1904 he resigned from the police force and received an appointment as Veterinary Inspector in the Health of Animals Branch of the Canadian Department of Agriculture, and was stationed at Maple Creek, Sask. Shortly afterwards he was transferred to Osoyoos, B. C., on similar work. Dr. Coristine was enployed continuously in the Department until the time of his death, and during this time was almost continuously engaged in boundary work at various ports along the international boundary of Western Canada.

Dr. Coristine joined the A. V. M. A. in 1921. He was buried under full Masonic orders. He left a widow and a small family.

G. B. CASH

Dr. G. B. Cash, of Grant, Mich., died March 4, 1924, at the age of 55. Shortly before his death he had a stroke of paralysis. He had been suffering from Bright's disease for about two years.

Dr. Cash was a graduate of the Grand Rapids Veterinary College, class of 1906, and had been in active practice ever since leaving college. He was a member of the Michigan State Veterinary Medical Association and a regular attendant of the meetings. He attended the Veterinary Short Course, at the Michigan Agricultural College, in January. Dr. Cash is survived by a widow and four children.

MRS. L. H. HOWARD

Mrs. Lester H. (Gertrude E. Wells) Howard died in Boston, March 20, 1924. Although she had not enjoyed good health for some time, acute illness of only three days duration preceded

her death. Members of the Association who were at Montreal will recall that Mrs. Howard attended the meeting with Dr. Howard. Services were held at Clinton, Mass., her former home. The members of the Association join in expressing their heartfelt sympathy for the family in their bereavement.

MRS. DAVID S. WHITE

Mrs. David S. White, of Columbus, Ohio, died April 25, 1924, after an illness lasting several weeks. She suffered an acute attack of erysipelas, which was at first confined to her face, but spread to other parts of the body. Funeral services were held Thursday afternoon, April 17. Mrs. White attended the Montreal meeting with Dr. White, last summer. The JOURNAL joins in expressing, to Dr. White and the members of his family, sincere sympathy in their sad bereavement.

MARRIAGE

Dr. Custis Mercer Thomas (U. P. '22), of Nassawadox, Va., to Miss Florence Alviva Phoebus, at Oriole, Md., November 14, 1923.

BIRTHS

To Dr. and Mrs. Ray Church, of Clear Lake, Wis., a daughter, Wilma Mae, November 11, 1923.

To Dr. and Mrs. E. A. Hays, of Lanesboro, Iowa, a son, Merlin Burton, February 10, 1924.

To Dr. and Mrs. Homer A. Wilson, of Jefferson City, Mo., a daughter, Mary Ann, February 16, 1924.

To Dr. and Mrs. M. R. Sebright, of Crofton, Nebr., a son, Russell Ordean, February 21, 1924.

To Dr. and Mrs. S. C. Varnum, of Leon, Iowa, a son, George Robert, February 25, 1924.

PERSONAL

Dr. D. E. Whatley (Colo.) has located in Topeka, Kans.

Dr. J. W. May (Ala. P. I. '21) is practicing in Mobile, Ala.

Dr. A. J. Burley (Corn. '05) is now stationed at Sheridan, Wyo.

Dr. A. A. Crank, formerly at Lorraine, Ill., has located at Golden, Ill.

Dr. James E. Masterson (O. S. U.) is City Veterinarian of Worcester, Mass.

Dr. C. L. Allen, formerly at Yazoo City, Miss., is now located in Memphis, Tenn.

Dr. J. R. Payne (T. H. '18), formerly of Brocton, Ill., has located at Jackson, Tenn.

Dr. J. B. Way (K. C. V. C. '14) has removed from Elkton, Ky., to Paris, same state.

Dr. J. E. Weinman (K. C. V. C. '13) gives his new address as 2525 O Street, Lincoln, Nebr.

Dr. Hubert C. Smith (Iowa '23), formerly at Jesup, Iowa, is now located at New Hampton, same state.

Dr. C. E. Wicktor (K. C. V. C. '17) has been transferred from Albert Lea, Minn., to Los Angeles, Cal.

Dr. C. A. Sayre (O. S. U. '14), formerly at Pulaski, Tenn., is now at 435 Arlington Ave., Jackson, Tenn.

Dr. W. R. O'Neal (K. C. V. C. '04), formerly of San Bernardino, Calif., is now located at Newman, Calif.

Dr. Earl J. Meixel, (K. C. V. C. '08) has been transferred from Baton Rouge, La., to Columbia, S. C.

Dr. H. W. Butz (Cinn. '15) has been transferred from Chicago to Cincinnati, on meat inspection work.

Dr. Chas. H. Greenfield (Chi. '12), of Detroit, Mich., has been elected Secretary of the Detroit Kennel Club.

Dr. D. C. Gearhart (Amer. V. C. '91), of Pittsburgh, Pa., gives us a new address as follows: 5544 Baywood St.

Dr. Robert J. Donohoe (Wash. '12) gives us Outlook, Wash., as his new address. He was formerly at Yakima.

Dr. E. B. Cavell (Ont. '06), of Northville, Mich., was an interested spectator at the recent dog show held in Detroit.

Dr. S. Brenton (Ont. '80), of Detroit, Mich., was recently called to Lexington, Ky., to operate upon a valuable colt.

Dr. W. W. Lichty, of Woodstock, Ill., has accepted the appointment as County Veterinarian of Cook County, Illinois.

Dr. J. H. Villeneuve (Mont. '15), of Montreal, Quebec, has had bestowed upon him, by France, the Order of Agricultural Merit.

Dr. W. A. Ewalt (Ont. '07), of Mt. Clemens, Mich., carried away the honors with his collies, at the recent Detroit Dog Show.

Dr. F. S. Swale, formerly of Ipswich, So. Dak., is now associated with the Maeser Silver Black Fox Company, at Hackensack, Minn.

Dr. John B. Lentz (U. P. '14), of Amherst, Mass., has received his commission as Major in the Veterinary Officers' Reserve Corps.

Dr. R. M. Staley (U. P. '06), of Philadelphia, Pa., has been commissioned a Lieutenant-Colonel in the Veterinary Officers' Reserve Corps.

Dr. W. C. Outhier (San. Fran. '04), formerly of Tulare, Calif., has removed to Yuma, Arizona, where he is engaged in city and county work.

Dr. Henry Singleton (K. C. V. C. '06) has been transferred from Houston, Texas, to Pittsburg, Kans. Adress: c/o Hull and Dillon Packing Company.

Dr. William Jopling (Amer. V. C. '87), formerly of Rose City, Mich., has associated himself in practice with Dr. C. C. Warn, 1713 Saluson Ave., Los Angeles, Cal.

Dr. E. T. Baker (O. S. U. '09), of Moscow, Idaho, is some bowler. He led the Moscow Elks' bowling tournament, which ended March 12, with an average of 165 for 48 games.

Dr. John W. Adams (U. P. '92), of Philadelphia, addressed the Cumberland Valley (Pa.) Veterinary Club, on the subject of "Surgery of the Reproductive Organs of Cattle," at a recent meeting.

Dr. W. H. Phyfe (Amer. V. C. '91), formerly at Middletown, N. Y., is now at 695 East 18th St., Paterson, N. J. Dr. Phyfe is Veterinarian for Borden's Farm Products Company, Inc.

Dr. A. M. Mills (Corn. '20), formerly a member of the faculty of the N. Y. State Veterinary College, is now with the Borden's Farm Products Company, Inc., with headquarters at Schoharie, N. Y.

Dr. W. H. Welch (Chi. '92), of Lexington, Ill., recently reported that the initial tuberculin test conducted in Lexington township, by County Veterinarian, Dr. P. L. Varble, failed to reveal a single reactor.

Dr. R. C. Dayton (U. P. '20), employed by the Supplee, Wills, Jones Company, of Philadelphia, is now stationed at Lewes, Del., in charge of the production of grade A milk, for a new cooling station at Nassau, Del.

Dr. J. G. Catlett (U. S. C. V. S. '16) Assistant Dairy Inspector, of Miami, Florida, has been appointed County Veterinarian of Dade County, Florida. Dr. Catlett has also recently received a Captaincy in the Veterinary Officers' Reserve Corp.

Dr. F. H. S. Lowrey (Ont. '05), Division Supervisor for Eastern Canada, in behalf of the Meat and Canned Foods Act, Health of Animals Branch, Dominion Department of Agriculture, has had his headquarters transferred from Ottawa to Toronto.

Dr. B. M. Underhill (U. P. '95), of the University of Pennsylvania Veterinary Faculty, addressed the Bucks County (Pa.) Veterinary Club, at the March meeting, his subject being, "Pathology of the Diseases of the Reproductive Organs of Cattle."

Dr. Julian Howard (Wash. S. C. '09) has been appointed as veterinary supervisor of the herds at the six state institutions in the State of Washington. Besides having the actual veterinary supervision of the animals in these herds, Dr. Howard looks after the care and feeding, sells stock ready for market and purchases new additions for the herd. The work of Dr. Howard was very favorably commented upon in a recent issue of *The Washington Farmer*.

Dr. J. F. McFarlane (Chi. '18), of Plankinton, S. D., was married to Miss Hazel Guindon, of Mitchell, S. D., a short time ago. Immediately after the wedding the happy couple returned to Plankinton, where arrangements had been made to celebrate the bride's birthday, at the home of her brother. Her birthday and wedding were then celebrated at the same time, and the following morning the newlyweds started on their honeymoon, to Montrose, S. D., and other points.